



# JOURNAL

OF THE

# MILITARY SERVICE INSTITUTION

MAR.  
1895.

JAMES C. BUSH, Editor.

*Authors alone are responsible for opinions published in the Journal.*

I. DISCIPLINE IN THE U. S. ARMY (Prize Essay)	Captain Ellis	211
II. PRELIMINARY EXAMINATION: WEST POINT	Lieut. Willcox	251
III. FROM THE GREAT LAKES TO THE OCEAN	Captain Kingman	276
IV. PHYSICAL TRAINING IN THE MILITARY SERVICE	Capt. Pilcher	295
V. THE ROYAL ARTILLERY COLLEGE AT WOOLWICH		303
VI. THE INFANTRY DRILL REGULATIONS	Lieut. Noyes	309
VII. COMMENT AND CRITICISM		316
"The Military Academy and the Education of Officers"—(Andrews, Larned, Tillman, Harvey, Black, Pettit, Birkhimer, Todd).		
VIII. REPRINTS AND TRANSLATIONS		
1. Mounted Troops in War	Major-Gen. Hutton	344
2. Military History	Saturday Review	357
3. Range and Position Finding	William Oliver Smith	361
4. The War Between China and Japan		381
IX. MILITARY NOTES		390
The New French Regulations for Ammunition Supply. Willson Disk Gun: Description. Woodbridge Wire-Wound Gun: Bursting of. German Infantry Soldier's Equipment: Reduction in Weight. Proportions of Commissioned Grades in U. S. Army Below that of General Officer. Military Provisioning of Paris. The Effect of Modern Rifle Fire. The Abolition of "The Support." New Cavalry Drill, U. S. A. Musketry Experiments. Buffington-Crozier Disappearing Gun Carriage: Description. Firth Armor-Piercing Projectile: Test. Dispatch-Bearers. Sterilization of Water.		
X. REVIEWS AND EXCHANGES		403
Organization and Tactics. General Hancock. The Military Medical Officer in Peace and War. Sanitation and Health. Range Manual and Score Record.		
XI. ANNUAL REPORT		415
XII. THE INSPECTOR GENERAL'S DEPARTMENT		417
XIII. THE SECOND REGIMENT OF INFANTRY		438

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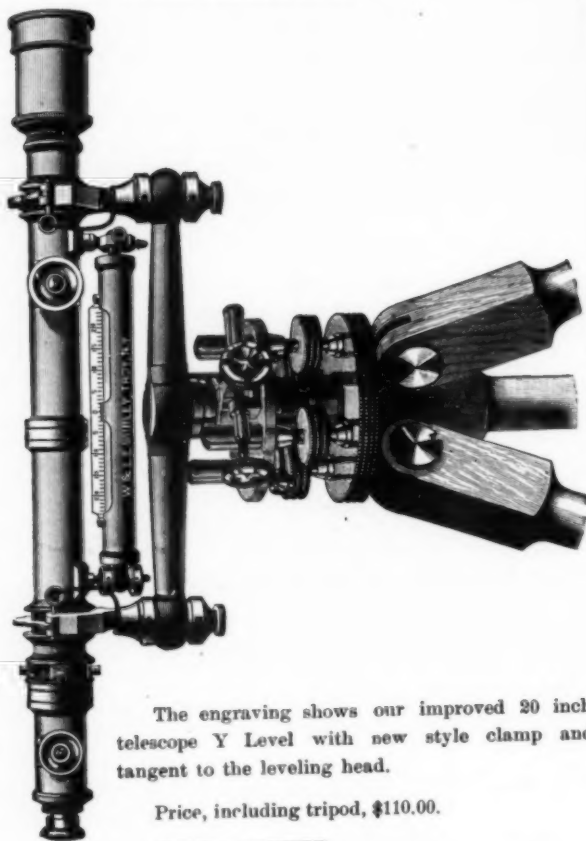
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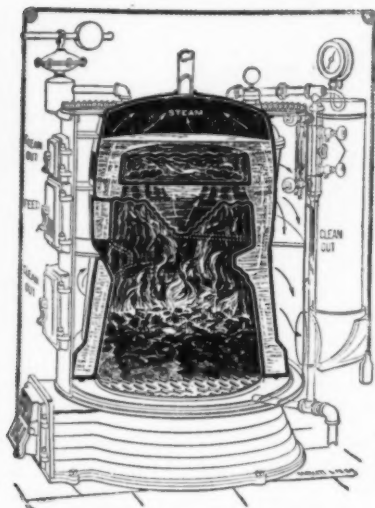
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Union Metallic Cartridge Co....	416 (c)

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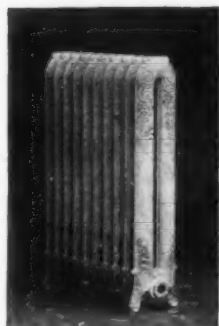
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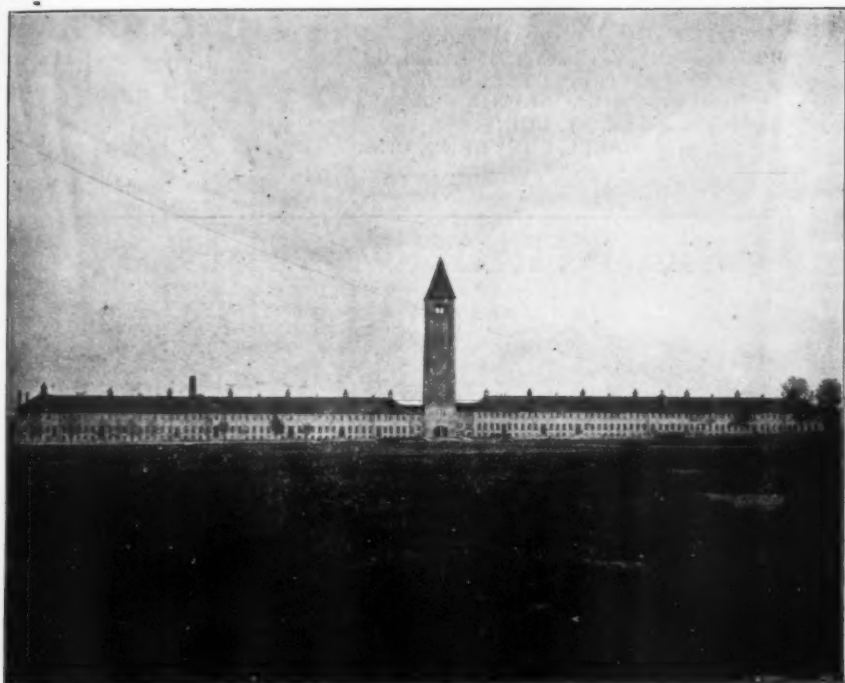
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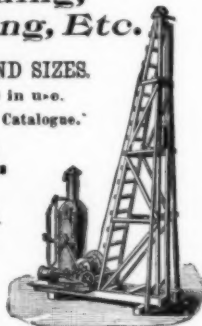
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OF THE  
UNITED STATES.

*"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."*—SHERMAN.

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Prize Essay.

DISCIPLINE :—ITS IMPORTANCE TO AN ARMED  
FORCE, AND THE BEST MEANS OF PROMOTING  
AND MAINTAINING IT IN THE U. S. ARMY.

BY CAPTAIN EUGENE A. ELLIS, 8TH U. S. CAVALRY.

"Your determination, therefore, to look closely into these matters, and to establish strict discipline, is highly proper, and will certainly be supported. An army cannot be governed without, and no mistake in him who commands is greater, or more fatal to its existence and the welfare of the country, than lax discipline. Nor is it the right road to true and permanent popularity. Civility is due to, but obedience is required from, all its members. These, accompanied with strict justice, and a proper attention to army rights and wants, will secure love and respect; while one indulgence begets an application for another and another until order is lost in disorder, and contempt of the commander brings up the rear."

Letter from General George Washington to Maj.-Gen. Chas. C. Pinckney, dated Mount Vernon, March 31, 1799.

**D**ISCIPLINE by derivation, we learn in Webster, is the treatment suited to a *disciple* or learner. Those whose exertions aim at developing the recruit into the soldier, and at giving the learner ability to act with his comrades on the field, arrive at a conception of the idea contained in the word; but it is a limited and restricted idea, and may be expressed by the synonyms "military training" or "drill."

If we stop to reflect a moment, we will remember that not all well drilled commands are in a state of perfect discipline, and that fair discipline may exist with poor drill. Evidently this idea of "drill" or "military training" is only a first approximation to the



true meaning of the word, the fault being that it is not comprehensive enough. This first approximation is content to limit itself to the physical part of the personnel of the army, ignoring entirely the greater and grander part, the *moral*. We can see at once that this part cannot be omitted, for, the question being of soldiers under the oath of obedience, the perfect work is obtained only when the disciple or learner is developed both in mind and body. Therefore, any definition that fails to comprehend this moral part of an army is defective.

In these days of progress and education no one presumes to declare himself complete master of the art of war; but one and all remain learners to the end of their lives. From the highest to the lowest, then, all are comprehended in the scope of the definition given above; and all should submit themselves to discipline, and be governed by its rules.

Having shown that discipline is binding on all, and comprehends military training and moral development, we can now arrive at our final approximation and our

#### DEFINITION.

Military discipline consists in training the minds, bodies, and tempers of officers and men so that each unit of the army shall, in peace or war, be of the greatest use and credit to the country.

We are informed that Charles VII. of France created the first militia on account of the necessity he felt of having always at his bidding an armed force under discipline. He had suffered from the inconvenience of losing at each *ban* many days in equipping the foot soldiers, and in getting them ready to march. He ordered each canton to keep at all times one man armed with a bow, always provided with all he needed for war, so that on the very day of the convocation he could start. The king having experienced the inconvenience of taking the ill-assorted units of the levy, and, by laborious efforts, accompanied by loss of precious time, subjecting them to military training and subordination, took the wise step of creating an armed force, always disciplined and trained for war. It is not too much to say that, in an age when military training was part of the education of the male inhabitants of France, the thing that the king was really desirous of gaining was the discipline rather than the training. This enlightened prince saw the inherent weakness of an aggregation of armed individuals, as armies had been up to that time, and recognized that

discipline was what was needed to bring about cohesion among the atoms, and to give him a strong weapon to wield against his enemies. From that day to this, discipline has been considered as the true essence of the efficiency of an armed force.

If we take the veriest novice in affairs military,—the “greenest” recruit that ever joined the colors,—and place him among strangers, he will be able at once to tell whether he be in the midst of an orderly body of soldiers, or of a mob, even if the latter be in uniform. He will recognize the fact that something whose presence he can feel, and whose effects he can perceive, distinguishes the former from the latter. He may not be able to give this distinguishing quality its proper name, but he will be keenly alive to all that gives superiority to the one, inferiority to the other. He will see in the first, order, regularity, subordination, respect for law and regulations, and devotion to established government; while in the second all these qualities will be wanting, and in their places will appear, disorder, license, insubordination, disrespect for leaders, and contempt for law. Or, in other words, he will see that the first body acts under military discipline, each part subordinated to the will of the leader, and all united into one harmonious whole, while the mob acts individually, each person according to his own whim. A mob may have, to be sure, so called leaders,—but even when they try to bolster up their popularity by absurd appeals to the prejudices and passions of the hour, like Jack Cade in Shakespeare, they find obedience and respect only a matter of the moment, to be thrown off with the same levity that characterized their assumption. Concert of action comes only with discipline, but, since the success of military operations depends more on concert of action than on any other thing, we see the great importance of discipline to any armed force engaged in military operations. The measure of an organization's efficiency is the measure of its discipline.

If the stomach be deprived of food, the corporeal body will get weak, fade away, and die; when deprived of discipline, the military body will perish in the same way.

The Athenian swore on entering military service not to dishonor the profession of arms; not to save his life by shameful flight; and to fight to the last breath for the defense of his country with his fellow citizens, and alone if necessary. Troops animated by the spirit of the Athenians can be annihilated, never

conquered. Thermopylæ is only one of many glorious fields where discipline made up for lack of numbers.

One of England's famous regiments is known as the "Die-hards," in commemoration of their conduct on that bloody battle-field where, held in the iron bonds of discipline, they stood and fought and died, when others might have run and lived. Discipline can make up for lack of numbers, but nothing can make up for lack of discipline. An overwhelming number of undisciplined troops is the greatest source of weakness, for, the greater the number, the greater will be the confusion caused by lack of discipline. Troops without this all-essential attribute are more pernicious than useful, more formidable to friend than to foe.

To fight the enemy in the field, and to gain a decisive battle, is the object of the master of the art of war. No general of prudence will submit so important a matter to the hazard of chance, unless his troops be disciplined; for his mind recalls too many occasions when lack of discipline has lost battles, ruined campaigns, and laid empires prostrate in the dust.

"Discipline," says Marshal Saxe, "is the soul of the military state; if it be not established with wisdom, and maintained with firmness, without distinction of rank or birth, one cannot count on troops." When a nation, from any cause, sees the bulwark it has erected in its defense, at great cost and by prodigious efforts, so weakened by lack of discipline that it cannot be counted on, History takes up her pen, knowing full well that the downfall of another nation is about to be recorded. After Cæsar's legions came the pretorian guards; after the discipline that conquered the world came the license that placed the barbarian on the throne, and laid these brilliant conquests at his feet.

The importance of discipline to an armed body is almost axiomatic in its character. We do not try to establish the truth of an axiom by argument. We are well content to limit ourselves to its assertion. Still I hope I will be pardoned for giving a final, most striking and conclusive instance of its importance. Capt. Mahan, in his "Influence of Sea Power on the French Revolution and Empire," depicts at length the state of affairs that existed in France at the time of the Revolution, and shows how the doctrines of equality and fraternity bred contempt for educated officers and trained seamen for the navy, and filled the places of the really magnificent personnel bequeathed to the

country by the monarchy, with material but poorly fitted by past experience and training for the new duties.

To show how pernicious this system had been, Capt. Mahan quotes a French admiral as follows: "The popular societies have been called on to point out the man having both seamanship and patriotism. The societies believed that it was enough for a man to have been long at sea to be a seaman, if he was besides a patriot. They did not reflect that patriotism alone cannot handle a ship. The grades consequently have been given to men without merit beyond that of having been much at sea, not remembering that such a man often is in a ship just as a bale is. It must be frankly said it is not always the man at once most skilful and patriotic that has had the suffrages of the societies, but often the most intriguing and the falsest—he, who by effrontery and talk has been able to impose upon the majority." (Mahan, Vol. 1., p. 56.) Fine regiments of Marine Artillery were disbanded on the plea that it was not the special privilege of any one class to defend the country, that all should share in that most sacred duty. Is it to be wondered at that "the tone and efficiency of officers and men were lowered," and that lack of discipline, insubordination and mutiny followed? The fleet was reduced to a state of helpless inefficiency, and France was forced to yield command of the sea to England.

In this great work, the author shows how the possession of sea power kept England secure at home, and enabled her to shut out supplies and in the end to so exhaust France that that nation came to the end of its resources, and the baffled emperor was forced to give up the struggle he had had the genius to maintain so long. Surely the fact that this great warrior owed his downfall to a lack of discipline in a service he held in slight esteem in comparison with his great army, ought to be pregnant with lessons for us all.

I have heard it contended that the democracy introduced into the French army and navy by the Revolution was a plant of slow growth, and the full effects of its malign influence were not felt until France and Germany engaged in deadly struggle in 1870, and Napoleon III., like his illustrious predecessor, had to accept defeat and overthrow because of discipline undermined by the pernicious teachings of democracy.

Frederick the Great once said: "Pour faire la guerre, il faut de l'argent, encore de l'argent et toujours de l'argent." I am in-

clined to believe, that, if that great mind could revise this sentence, he would be in favor of striking out "*de l'argent*" and of writing "*la discipline*."

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In every scheme of discipline there must be a system of rewards to encourage those that submit themselves to its requirements, and a system of punishments to deter those inclined to disregard the same. There is nothing that the public contemplate with more equanimity than the legal punishment of offenders against law and regulations; and certainly there is nothing that has produced greater upheavals in social and political institutions than have cruel and unjust punishments. Our ancestors recognized this latter fact and, by the first series of amendments to the Constitution, made the prohibition to inflict "cruel and unusual" punishments part of the law of the land. Every system of punishments should be sanctioned by law; the first requisite of a scheme of discipline, is that it be maintained by legal means.

An officer's efforts, however, should not be limited to the punishment, through methods sanctioned by law, of infractions of discipline; but they should, at all times, be directed toward the prevention, rather than the punishment of crime. The surgeons of an army do not stop at the care of the sick and wounded, but, by an insistence on an observance of the laws of health and hygiene, try to ward off all causes tending to affect the physical efficiency of their charges. Let the officer imitate the surgeon, and ward off all causes tending to affect discipline. By these means, and by these alone, can the units be of the "greatest use and credit to the country."

It is a matter frequently observed that when a command begins to fall off in its discipline, the punishments increase in severity; and when discipline is lax, legal means are frequently disregarded, arbitrary punishments inflicted, and the rights of the individual disregarded; so that the punishments cease to be of value as examples to others—which is, in fact, the principal object of the infliction of all punishment. In a company where strict discipline is the rule, the confinement of a man for one day only, has, perhaps, a greater effect than has a much more severe punishment in an organization where lax discipline prevails. Swift punishment by legal means, with impartial justice, should be insisted on by our authorities; and one and all should be encour-

aged to strive for that great desideratum, "a maximum of discipline with a minimum of punishment."

Discipline being founded on law, we naturally expect to find the precepts of discipline framed in the law of the country, and we are not disappointed. While there may be some precepts in the laws of certain countries applicable only to the people of those countries, in order to meet peculiarities of race, religion, or form of government, all unite in certain general directions that are applicable to our subject under all circumstances.

To two of these general directions I wish to invite attention, for on these two as a foundation, is raised the whole structure of discipline. They are: 1. Obedience to Orders, and 2. Respect for Superiors.

#### I. OBEDIENCE TO ORDERS.

Our law contains the direction on this point in as good form as any other, and may with propriety be quoted: "Inferiors are required to obey strictly, and to execute promptly, the lawful orders of the superiors appointed over them." Discipline being the keystone of every military body, we are not surprised to observe that, when our authorities were engaged in framing regulations for the government of our army, the first article of those regulations is on "Military Discipline," and that the first paragraph is the one I have just quoted. The authorities of all armies place all soldiers under an oath of obedience; and the importance of obedience as a duty is impressed on the recruit from the first lesson.

The word "obey" comes from the Latin, and means to give ear to, to hear. The old saying, "to hear is to obey," has in it, then, more, perhaps, than we at first imagined; at all events it is founded on etymological truth. This obedience is binding on us all. Every one of us is, to some one else, an "inferior." As we go up the scale of military rank from private to general the same obligation exists, finally, when we get to the highest in authority, the President, who is, by the Constitution, the Commander-in-chief, we find that he, too, has to obey the people who have placed him at the head of this great nation.

Please observe that we are not only to obey, that is to hear, but we are to obey *strictly* and to execute *promptly*. There is no middle ground here. There are placed before us two things, obedience and disobedience, and, unless we obey as we are told to



love the Lord, "with all our heart, and with all our soul, and with all our mind," we will find no security. Obey strictly, and execute promptly, and ever be convinced that those placed over us are regardful of the responsibilities of the obligations of command. Remember, no obedience, no discipline; no discipline, nothing military. We will not call mere lip-service and an observance of outward forms, obedience either; it must spring spontaneously from the heart. We must not give ear because we have to, but because we love so to do. A famous Russian general says: "A moment decides a battle, an hour the issue of a campaign, and a single day the fate of an empire." For us, mere atoms, it may be, in our superior's plans, blind, implicit obedience is the only safe rule. The obedience sung by Tennyson should be ours,

"Theirs not to make reply,  
Theirs not to reason why,  
Theirs but to do or die."

## 2. RESPECT FOR SUPERIORS.

Von der Goltz has in his "Nation in Arms," stated the duty of an officer to his men so clearly and ably that I fear that any effort at condensation by me will not do justice to his reasoning, and I therefore quote him *in extenso*: "Influence over the soldier must be gained in time of peace by a proper application of the superior qualities of intellect and character in training and leading them. Before all else this must also include care for the well-being of the soldier. A decay in the officer-corps, and its influence arises so soon as the officers begin no longer to trouble themselves about the private soldiers, and to confine themselves merely to giving orders. When their authority over their troops can only be enforced by noise, it is as a rule but feeble. The worse the discipline in an army is, the more despotic a form it assumes. Besides this influence that has been gained, example is requisite, and this is more the case in time of war than in peace. The officer must not spare his life, only in order to urge on his troops, he must frequently expose himself more than the ends of battle would otherwise at the moment demand. By thus showing himself unusually fearless and self-sacrificing, he awakens noble impulses in the soldier's breast, for only by these can great deeds be done. To the officer's class there is, accordingly, due of internal necessity, a more favored position in the state. *Noblesse oblige*. He who is accustomed to regard himself belonging to a



special class will also in war consider himself bound to do something special. But he who, on the other hand, always lives in an inferior and subordinate position will only in few cases feel himself impelled to suddenly distinguish himself. Slaves are always cowards. But the slavery of an inferior state of life is no less depressing than any other. It deprives a man of pride, which is as indispensable to an officer as is his daily bread, to enable him under the trying circumstances of active service to show his authority." (Von der Goltz's "The Nation in Arms.") Need I say more? Let us suppose that such an officer is in command of troops, and has by personal qualities and example obtained an influence over his men and with it their respect. Should his efforts end here? By no means! His efforts according to my ideas have only commenced. He has prepared the ground, and seed planted there will take root and grow. The moral education of the soldier can now be entered on with a fair prospect of success. Pride, so essential to the officer, should be roused in the breast of the soldier. This will be done when the soldier sees that the officer has pride, not alone in himself, but in the organization he commands, and in the soldier himself. Noble impulses, as Von der Goltz says, will be awakened, and a desire to justify that pride of the officer, to retain it, to strengthen it, will be formed, and with this desire will come self-pride, which is precisely what we wish to develop in our men. There are few natures we meet with in life that remain irresponsible to such influences; even the most hardened and callous will be moved. As soon as he understands that his misdeeds affect not only himself, but his captain and his comrades, he will not, unless wholly incorrigible, lightly repeat his offenses. Hand in hand with self-pride comes ambition. The desire for advancement should be encouraged, and the soldier aided in his resolve to be a better soldier if he continues in service, or a better citizen if he quits the colors, and goes into civil life.

The soldier should be taught as part of his moral education that his oath of enlistment which, perhaps, he considers only a preliminary to entry into service, has a higher and grander meaning—that he should obey and be a good soldier because he has taken an oath to do so, and has called God to witness it, and to aid him in keeping it. Teach him fidelity—fidelity to his oath, and fidelity to his country. An officer who can say that he has made his men respectful, self-respecting (for that is what I mean by rousing in

them "self-pride"), ambitious, and faithful, has accomplished a great work, a work great not only in its military aspects, but also in its moral aspect. He has stamped his personality on that troop, and in so doing has returned many a wanderer to the path of rectitude. Surely such a man has not lived in vain.

In order to attain its highest perfection every system of discipline must be founded on patriotism. This love of country must be so ardent and so deeply-rooted in the soldier's breast that he will unflinchingly make any sacrifice in the defense of his native land, even to the unhesitating yielding up of his life—with no other emotion than regret that he has but one life to give in so noble a cause. Slaves and mercenaries are incapable of such feelings. We may buy their services and even their devotion up to a certain point, but, when put to the final test they fail, because the divinely-implanted sentiment is not part of their nature. Only patriots can give "that last full measure of devotion" so eloquently portrayed by Lincoln, about to win a martyr's crown himself in the service of his country. In the education that takes place in attempting to make the units "of the greatest use and credit to the country," the lesson of patriotism is of paramount importance.

We must not think when we have secured patriotism that we have attained all that is requisite for discipline. We must have our discipline characteristic of the age, race, and country. The discipline of the Middle Ages, when the lord held the right of life and death over the villain, is not compatible with this age of progress and enlightenment. A race that remains patient under despotic rulers can receive a discipline to which freemen would never submit. Skobelev has said: "Discipline should be iron, but it is established by the moral authority of the commanding officer, not by means of his fist." If this can be said about an army whose men are the most patient, and whose officers are the most autocratic in Europe, with how much force must it apply to a republican army, every member of which has been taught to believe that all men are created free and equal, and that certain unalienable rights are his by right of birth. Republican institutions stand in the way of any engrafting of the continental system of blind, minute, pedantic discipline on such an army. The submissive, unthinking discipline of the German or the Russian destroys initiative and individuality. These are peculiarly American characteristics, and any American system in which these are

suppressed would be weak and inefficient. It is a fact that the average of intelligence in our country is greater than in Europe. This superior intelligence coupled with the American characteristics mentioned above has produced a discipline that is less exact and more intelligent.

Any comparison that is made between the systems can reflect only credit on ours. In one we have discipline by instinct,—a system in which the mind and the body of the soldier have only the freedom of those of an automaton. In the other we have discipline founded on reason,—a system in which full play is given to the versatility and individuality of our people.

The discipline of an autocratic army will be at its best in time of peace, because the system, being regulated down to its minutest detail by rule and regulation, can flourish only when uninterrupted; war, which is emphatically the season of the unexpected and the adventitious, is bound to shake it to its very foundations.

On the other hand the discipline of a democratic army will be strengthened by war, because the superior intelligence of the members will teach them that, in order to win, they must do all in their power to further the plans of the chief, which can best be done by a rigid adherence to the rules of discipline.\*

The free intelligent discipline of the freeman is the only system that can be tolerated in the United States—a nation that has fought one war to free itself, and another to free the bondman within its borders.

Having determined what discipline is, and what kind is best suited to our country and our institutions, there remains to discuss how we can improve that discipline in our regular army. I think no argument is necessary in defense of the general proposition that an improvement will take place in the aggregate only after an improvement has taken place in the individuals; by this I mean that discipline will be at its best in our army when our officers are best calculated to inspire discipline, when our non-commissioned officers are best calculated to maintain it, and when our privates are best calculated to receive it.

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\* Several years ago the writer saw an article in some service magazine entitled, he believes, "Discipline in Democratic Armies." He made notes at the time and has freely used the same in the preparation of this part of his paper. He regrets to state that when he took the notes he neglected to take the name of the writer or of the magazine in which the article was published. He regrets exceedingly that his unfortunate oversight now prevents him from giving credit where due.

First, as to the officers of our army. Are they all they should be? The Inspector General, who surely is in a position to know the truth, says: "The officers have frequently been commended and were probably never more efficient." The testimony of eminent men throughout this broad land has been expressed on many occasions on the same lines of praise and commendation used by General Breckenridge, and I would be the last to question the justice of that praise, or to say that it was undeserved or out of place. To the great mass of our officers this praise gives little compensation for the lives of devotion, sacrifice, and frequent hardship they lead. For them no praise is too great. The majority of our officers are the peers of any officer-corps in the world in point of capacity, zeal, and soldierly qualities. They lead lives that, from the moral and military point of view, have ever awakened the admiration of all acquainted with them. In short they are soldiers who honor the profession of arms.

It must be confessed, however, that while the majority of our officers are striving, frequently in the midst of difficulties and discouragements, to do their duty in the fullest sense of the word, there are others who are not so actuated, and who, by bad conduct and example, frequently render nugatory the efforts of the more zealous. There is no need to palliate or hide the fact; there are some officers in our army for revenue only.

The saying that the army would be a nice place were it not for the soldiers, was uttered, I have been told, by a fine soldier, and in a spirit of fun; but by use it has been consecrated to the service of the class of which I speak, and is the language with which they voice their sentiments to-day. They are in the army, but are not of it, and the soldier—the most sacred trust with which an officer can be endowed—is the last object of their interest and care.

These officers, being in the army (as I heard one of them say), "for what there is in it," are not impressed with that nice sense of their position that makes them at all times the model of their humble associates. Inattention to dress, to the niceties of the service, and to the amenities of polite society, indulgence of their vices and appetites, and disregard and neglect of their duties, can with truth be laid at their doors. The preëminent position they occupy as officers and gentlemen is forgotten; the good name of the army is dragged in the mire. The presence of such an element in a garrison is a positive detriment to the service, and is

most disastrous to discipline. One such officer can undo the work of a score of good ones.

In addition to this class whose vicious propensities make them dangerous, there is another class that strikes at discipline unwittingly but quite as effectively. I mean that class whose habits and intentions are good, but who fail to excite the respect and admiration of their men because of inefficiency, weak will, or infirm health. I have shown how essential it is that the officer should be respected by his men. Perfect discipline and lack of respect of military superiors cannot exist at the same time in the same body. In my scheme all those who fail thus to win the respect of their men are to be weeded out. Certainly, in any scheme, the shirk, the vicious, the inefficient, the military invertebrate, and the valetudinarian can have no part.

The deplorable effects of the existence of these classes in the army can be remedied by a little more care in appointing, and a little more care in applying machinery already in the hands of our authorities by which the weeding-out process would be prompter and more thorough.

The writer well remembers the feeling of wonder he experienced when a cadet, at seeing a certain first-class man, whose bad character was a matter of public notoriety, graduate and later receive a commission. When more experienced he realized that ability to pass certain examinations, and a certain dexterity in avoiding demerits permit any one to leave the Military Academy with its stamp of approval. As a result it is possible to graduate from that institution men who are not fitted to be officers. I do not say that this happens frequently, for I do not think it does. The average graduate at graduation is a fine manly fellow who commands respect from one and all. Nevertheless cadets but reflect the intelligence and character of the district they represent; and it is but fair to presume, in an education that has for its prime object the fitting of young men for the command of soldiers, that some will fail. It is inevitable that some there will be who cannot attain that command over Self that is so necessary as a prerequisite to the command of others. A faculty for command is not given to all. Place these failures in a troop or company and they might, on account of their superior mental attainments, reach the dignity of company clerks; but no sane captain would ever appoint them corporals. Yet under the present system such cadets may pass the West Point examinations and enter the army

where they are certain to be an innocent menace to discipline, because the soldiers cannot respect them. I can only repeat, that any officer who fails to make himself respected by his men is a menace to discipline and should be eliminated. The graduation of this class as officers is wrong and should be stopped. The Academic Board should be continued in its power to graduate as at present all that pass the required tests. The Board should have the added authority to determine, subject to no appeal whatever, those fitted to enter the army. Commissions should be given only to those receiving this final academic certificate of soldierly qualifications.

Soldiers respect instinctively certain classes of officers. Respect springs more spontaneously for the class of officers that gained their experience during war-time, and, of those appointed since the war, respect is greater for the graduate of the Military Academy, and for the officer who has risen from the ranks. Remember, please, that I am speaking of *classes*, not *individuals*. In other words the soldier respects most the classes that by severest tests have earned the right to command them. Any relaxation of this severity of tests in the interests of individuals is viewed with suspicion; and persons so favored suffer a certain loss of prestige.

From the standpoint of discipline alone, I would limit appointments into the army to two classes; to those whose paths to a commission lead through the Military Academy, or through the ranks. If civilians are to be commissioned I am in favor of causing them to pass examinations of such a character that the mere fact of passing them would proclaim to all concerned that they unite in themselves both the theoretical knowledge of the graduate, and the practical knowledge of the officer risen from the ranks.

To sum up, as regards more care in appointing: I would have our authorities mindful of the requirements of discipline, and by a wise use of the appointive power aid in the development of our officer's corps. Let them discountenance the use of favoritism and political "pull." Let them by careful choosing proclaim that an officer's commission means just what it states; that the President "reposes special trust and confidence" in the recipient. Then surely all can follow the President's example—firm in the belief that that trust and confidence are not misplaced.

Having pointed out the first requisite for improvement in our



officers—more care in appointment—we have still to discuss how the army can be freed of the undesirable elements that I have shown to exist among those already appointed,—the idle, the vicious, the inefficient, and the infirm. Perhaps it may be said that with our retiring and examination boards we have all the machinery necessary to rid the service of these elements. To any such statement I reply: "True, but that machinery fails to accomplish the objects for which it has been created."

The examination boards apparently approach their labors with diffidence, assume that an officer's character is good, and by such assumption defeat the very object for which they were called into being. These boards by law are required to investigate an officer's mental, physical, and *moral* qualifications for promotion. In many cases the physical examination is a farce. The very class in which, in the nature of things, infirmity is to be expected, the field officers, is exempt from all examination. This exemption sometimes leads to gross absurdities, such as field officers who cannot ride, field officers too deaf to properly hear evidence on courts-martial, etc. A certain examination board, well-known in the army, the line members of which were field officers, found two officers who appeared before it physically deficient on account of deafness, in the face of the fact that two of the members were far more deaf than either of those found physically deficient. It may be well to add that my authority for this statement (one of the members) also says that the third line member was suffering from physical disability that would have insured his rejection if he had been subjected to examination.

The machinery we have can with a little tinkering be made to work; and there is no doubt that it should be made to work to the utmost of its efficiency. All officers should be examined for each promotion. For the juniors—that is, those below the rank of major—this examination should be most rigid, embracing the officer's mental, moral, and physical attainments. All the department, regimental, post, and company commanders the officer has had since his last examination, or since his entry into service, if this be his first, should be examined *under oath*, as to his qualifications; they should be made to state specifically whether they do or do not know of any fact or circumstance that renders promotion inadvisable. The physical record of the officer should be furnished by the Surgeon General, not by the officer. He should

be subjected also to the most rigid examination physically, by the medical members of the board. The mental examination should be as at present with all lax features removed. Field officers should not be excused from examination. The mental part might be dispensed with ; but the moral and physical parts should be insisted on, as of the greatest importance.

But we must not forget that examinations are not frequent events in an officer's life, and that they cannot be relied on alone for getting rid of the undesirable. There remain the retiring board and the court-martial.

There exists a strange propensity to shield this undesirable class, a sympathy with their infirmities, a disinclination to be the one to take the initiative, and a patience in handling them almost beyond human belief. There exists also with this toleration a determination on the part of the officer of bad character to take full advantage of this toleration. We can all, doubtless, recall many instances where the faults of the vicious have been overlooked from mistaken motives of kindness by commanding officers and can also recall with what promptness the act of forgiveness has been followed by the commission of other faults frequently more aggravated. This spirit of toleration is in our army, and as a consequence vice and inefficiency flourish side by side with merit and order. The single fault of an ordinarily well-behaved officer is frequently viewed with more harshness than the numerous infractions of an habitual offender. The fountains of sympathy are always flowing for those that deserve it least. This, I believe, is human nature, but we must not forget it is in a lesser degree a manifestation of the same maudlin sentimentality that showers the last days of the murderer with flowers and various delicacies. The continuance of this spirit of toleration of the vicious is the surest means of which I know of building up a system that in the end will be the ruination of discipline.

I would therefore remove as far as possible the danger of the evil effects of this weak-minded toleration. I would have an impersonal, impartial bureau of the War Department demand from all superiors monthly efficiency reports concerning their subordinates. The reports should be so comprehensive that they would embrace all necessary data concerning the officer's mental, moral, and physical attainments ; and they should be so made that there can be no dodging the point at issue ; or, in other words, the Effi-



ciency Reports kept at the War Department of officers should be such in the fullest sense of the word.

With the machinery working as it can be made to work, let there be a frequent scrutiny of these Efficiency Records; and as soon as an officer appears to have lapsed into any of the undesirable classes, apply the proper remedy; honorable retirement for those broken down in service, and dismissal or retirement wholly from the service for the rest. Then, indeed, would "the officer" be synonymous with "the gentleman," and every officer would be mentally, morally, and physically sound and well qualified to lead his men, and by example and precept to arouse in them that "educated fidelity" to country and profession that is the essence of all true discipline.

In this connection it may be well to add certain extracts from General Orders that have been published to the army, and that, as far as I know, are still part of the written law governing us: The first extract to which I invite your attention is from a General Order published May 22, 1797, and is as follows:

"In military institutions the force of example is incalculable. No officer, therefore, can be excused from parades, regimental or general, except in cases of actual sickness or confinement; the officer who feigns sickness to elude duty is a dishonor to his cloth, and will be held in infamy; and should any officer or non-commissioned officer (be his command ever so diminutive), betray such indolence and insensibility to professional obligation, as to omit one regular roll-call, he shall be made an example to the army."

The second is from General Order No. 53 of 1842:

"At a time when, notwithstanding the smallness of the establishment, thousands of the most promising youths are desirous of military commissions, the country has a right to demand—not merely the usual exact observance of laws, regulations and orders, but yet more—that every officer shall give himself up entirely to the cultivation and practice of all the virtues and accomplishments which can elevate an honorable profession. There is in the army of the United States neither room, nor associates, for the idle, the ignorant, the vicious, the disobedient. To the very few such, thinly scattered over the service—whether in the line or the staff—these admonitions are mainly addressed; and let the vigilant eye of all commanders be fixed upon them. No bad or indifferent officer should receive from a senior any favor or indulgence whatsoever."

The first of these extracts was published to an army filled with veterans of the Revolution, and the second to that army which subsequently fought the war with Mexico, and they prove conclusively my contention, that our army has always been cursed in this manner by the undesirable few; and that from the Revolution to the present time, this class has been frequently threatened, never effectively excluded but once, in 1870 when a decrease in the army forced our commanding officers to act—and, notwithstanding isolated instances of injustice, which would not occur with a permanent and more perfect system, the results were for the increased efficiency of the army.

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We now come to the second class of the personnel of our army, the non-commissioned officers, and to a discussion of the improvement of which they are susceptible.

In glancing over the report of the Inspector General, I have been struck by the unanimity with which company commanders agree that this class is not what it ought to be. They do not specify wherein it is wanting; we are left in ignorance as to whether our non-commissioned officer does those things that he ought not to do, or leaves undone those things that he ought to do; but nearly all unite in the statement that the cure for the evil lies in "more pay." There is no doubt as to the army sentiment in this particular. I am one of the many who believe that there is plenty of room for improvement. I am also firm in my belief that this unsatisfactory state in which we find our non-commissioned officers is due to the system under which they act, rather than to any deficiencies inherent to themselves. They are, I am persuaded, fairly well instructed, intelligent, anxious to do right, and keenly alive to the duties and responsibilities of their office. They do not, however, get that hold on the men that they should have, in order to attain and maintain perfect discipline. The reason for this failure cannot be ascribed to any one cause. I hope, however, to show several causes whose combined effects are to hamper the non-commissioned officer in his office and to detract from his efficiency.

There is in the service a class of men of mediocre attainments whom misguided ambition or the blarneying tongue of a recruiting sergeant has induced to enlist for a commission. These men are not at all disposed to hide their lights under a bushel, but make their object known as soon as they reach their

first post. There seems no signs of diminution in this class, for, now that the entire enlisted force can compete for this honor, the number is on the increase. I do not quarrel with the system, I am simply noting its effects on discipline, and in this connection now desire to point out that there are many in the service who openly proclaim that they are in search of a commission, while the number is very small that admit that they are in search of a warrant. I have never yet met a private who would say that he hoped to get chevrons. Seeing so many after commissions makes me believe that temptations have been held out to them to enlist—to be inevitably followed by disappointment to many. Ambition, I know, is a fine sentiment to rouse, but there is reason in all things; and no one is to be commended for rousing a sentiment that is pretentious, ridiculous, and unfounded on common sense. Mercy would say: "Rouse no ambition, if it is to be followed only by disappointment and unhappiness." When more men in our army are avowedly after commissions than warrants, we have over-stimulated many ambitions and these in their disappointment will react on discipline.

Remember, too, that a warrant nowadays can be wholly skipped in the upward flight to a commission. I hope no one will form a false impression as to my ideas on the propriety of giving commissions to men from the ranks. I am heartily in favor of the promotion of a few meritorious non-commissioned officers yearly. Some of the warmest friendships I have formed in the army have been of this class. I feel that the service is better for having them as officers. Recent law has placed a commission within the reach of all in our ranks, in the sense, at least, that all—private as well as sergeant—may compete. I do not see that anything has been gained by the change. A man that is fit to be an officer will in two years' time have his merit recognized by his company commander sufficiently to have chevrons on his arm. My plan contemplates the selection of the best privates only for non-commissioned officers, the education and development of this class to a point far beyond the privates, and the ultimate selection of a few of the very best yearly for the officer's class "*pour encourager les autres.*" I would regard the commissioned force in one respect as a social club to which no one desirous of joining should propose himself. If any one in the ranks does not have the idea suggested to him by his company commander or by some one else having knowledge, he

should take it as a hint that any self-proposing would be followed by black balling.

From this ideal system we have fallen to one that permits the self-proposing of the private soldier. A warrant, as I have said before, is not necessary to the aspirations of these scheming ambitions. However, many do in the end get warrants; and in this fact is one reason why our non-commissioned officers do not do all we expect from them. They are young in years, young in service; they are above their business; their ends are personal and largely selfish; and disappointed ambition makes them disgruntled and uneasy. In that "sizing up" that takes place in barracks the superficiality and hollowness of the claims of many of this class are perceived by the men, and ever afterwards the usefulness of this class as non-commissioned officers is at an end.

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The Inspector General has in recent reports given the army some very interesting statistics and tables, many of which bear directly on the subject under discussion. Among the numerous questions company commanders have been asked, the answers to which are there recorded, is one requiring a statement of the number of years the non-commissioned officers have served as privates before being made corporals. Naturally there is great divergence—the period varying from a few months to many years. I have had the curiosity to follow up a thought suggested by these tables, and I find as a rule that those companies that have this period a minimum in their regiments have the number of desertions and kindred evils a maximum. Does this not teach the lesson that grown men will not tolerate having placed over them as superiors, men who are in everything that pertains to *soldiering* their inferiors? In the barracks experience passes at its face value, and no counterfeit can take its place. To see the recruit elevated into the high places is galling to soldiers, good or bad. The bad ones get disgusted and desert; or get into trouble by the free use of the tongue in telling the recruit in uncomplimentary terms what they think of him, or by defying his authority; and the good soldier finds his respect for the authority that could commit the mistake of giving chevrons to such an ignoramus lessening alarmingly.

To the cry: "Nobody else to make," etc., I have nothing to say; but discipline is hurt if the recruit is made a corporal.

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A more frequent cause of poor discipline in a company is in

the forced association of non-commissioned officers and privates. This is a difficult subject to regulate, especially in long established posts with old barracks. There can be no well defined line of demarcation between these two classes when the former are compelled to eat, sleep, and live with the latter. A friend suggests that no man can be a hero to his valet; no sergeant to his "bunkey." In this case enforced association leads to familiarity, and familiarity we are told in the proverb, to contempt. But the damage is done long before familiarity has gone its full length. When thrown constantly with the private the non-commissioned officer will be inclined to be "easy" with his intimates; will drink with them, often at their expense. Now, if he does an extremely natural thing under the circumstances, and treats offenders with leniency, he injures discipline; if he tries to do his duty, the private cannot understand this sudden transition from hail-fellow-well-met to martinet, and friction ensues to the detriment of discipline.

A separation of private and non-commissioned officer should be made. Separate quarters and separate mess, with better food and better accommodations should be furnished. The private should be made to feel that the non-commissioned officer by his ability, conduct, and soldierly qualities has raised himself to a position of superiority; that a great gulf separates him from his sergeant, that is to be crossed only on invitation, and on strictly social occasions. Let his ambition be roused to get within this charmed circle. Frown upon all attempts at familiarity. Make the private respect the non-commissioned officer, and if any sergeant or corporal fail in the high conduct that should belong to his grade make the private respect the office, if he cannot respect the officer. Make intercourse between these two classes as much as possible official, and keep them apart.

This is a reform I consider vital to improvement of discipline, but it is one in which concert of action is demanded. The spasmodic action of a single company commander would only throw ridicule on the matter. All company commanders must be associated in it, but until a radical change has taken place in our barrack system perfect discipline is impossible.

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Any state of affairs by which privates are permitted to enjoy the possession of more money received from the Government than a non-commissioned officer enjoys, is detrimental to discipline. Chevrons are cheapened, and their wearers belittled by such a

state of affairs. Yet in every company there are several men that by extra duty pay are placed in this position. The cook is better paid than any of the sergeants except the first sergeant. I have known a man to take his discharge under G. O. 80 of 1890, and after two months to reënlist in another company to avoid being made a corporal and thus lose an extra duty place, which was held open for him until he came back. If the truth were known we would undoubtedly find that many similar cases exist. Chevrons are frequently declined because a soldier sees his true interests in extra duty pay.

All this is wrong. The evils of the extra duty system are manifold and well known to all who have soldiers to command, but certainly none of the evils is greater than this of a private's being the Dives and a sergeant the Lazarus of an organization. I would if I could, abolish the whole system; in case of my inability to do this, I would so reorganize the pay table that no private on extra duty should receive more than the pay proper of sergeant, no sergeant on extra duty more than the pay proper of first sergeant. Rather radical reforms, many will say; but I reply that these are suggestions for improvement of discipline, and no limitation has been placed on cost.

We are safe in assuming that extra duty pay as at present constituted is not too large. With this established it is a very simple matter to compute the pay that should attach to the various grades. Starting with the pay of private at \$13.00 and that of corporal at \$15.00 we get by adding \$15.50, the maximum monthly extra duty pay of \$30.50 as the amount beyond which the sergeant's pay must be established. Let us place it at \$32.00. Applying the same process to this sum, we get \$47.50 as the amount beyond which the first sergeant's pay should be placed. \$50.00 makes a convenient and proper resting place. Surely all acquainted with the manifold duties attached to this position will agree that the above sum would not be excessive to pay for the services of that *rara avis*, a *good* first sergeant. I would continue the corporals at \$15.00 per month, regarding them as but little removed from the privates, and undergoing a probationary service to determine their fitness for the higher grade.

Now I am not a believer in the doctrine that "more pay" solves all the troubles we now encounter in the subject of our non-commissioned officers. We have had good, bad, and indifferent non-commissioned officers under small pay; we have them



now under slightly increased pay ; and it is safe to say, *cæteris paribus*, we will have them with the rate of pay as above. I mean that increasing the pay will not overcome all the difficulties incident to the improvement of our sergeants and corporals ; but it will certainly eliminate some, and by clearing these away, will serve to aid us in better meeting those that remain. It seems to be conceded that more desirable material will be attracted to our ranks by larger pay. The experiment is worth trying therefore, for the question is, how to get the best material, and after once getting it, how to keep it. To pay a fair price for value received, seems to be the solution. An argument for more pay peculiarly applicable now is that we are at the present time expecting more from our non-commissioned officers than ever before. Certainly if they come up to our demands, being worth more than ever before, they ought to receive more. The Inspector General says : " The discipline and instruction of the service demand specially careful and continuous attention from the officers and non-commissioned officers during this transition period of armament and drill, when so many innovations have been imposed. *And the non-commissioned officer was never a more important and responsible individual than now.*"

To sum up. We need in order to develop better non-commissioned officers, and, in that way, to improve our discipline :

1. To have ambition more general in the ranks, and its aims not quite so high. Give commissions to the preëminent few, place the warrant within the reach of the deserving many.
2. To keep the ranks well filled with good men of experience, so that old soldiers, not recruits, will get the chevrons.
3. To make a radical change in our barrack system by which a separation will take place between the non-commissioned officer and the private and intercourse between the two classes will be limited as nearly as possible to the official.
4. To make a change in the extra duty system by which the non-commissioned officer will always be the financial superior of the private.
5. To give larger pay commensurate with the new duties and responsibilities we are placing on our sergeants and corporals.

We are taught that in the time of Joseph there was a famine in the land. Modern times are not exempt from a recurrence of the same calamity. It is not always a scarcity of food we have to apprehend. The would-be buyer frequently finds his gold a

dross because production is far behind demand. May not the Government with the best inclination and ability to pay well for efficient non-commissioned officers find itself in need of them and totally unable to supply them? With the present system of recruiting it seems to me we will be in such danger whenever times are flush and men prosperous. Hard times fill our ranks. The extra-desirable will get out as soon as the extraordinary circumstances that drove them into the army have no longer an existence.

I am inclined to believe that in the end we will find that our only salvation will consist in the enlistment and education of a special class from which we can draw our non-commissioned officers. There are many who believe that the navy system of enlisting apprentices is capable of being transplanted into our service with advantage. Capt. Wm. Quinton, 7th Infantry, Commanding Camp Pilot Butte, Wyo., is one of these, and in his Annual Inspection Report he states the case so fully and exactly that I make bold to quote him :

"The establishment of apprentice schools would give to the army a lot of good non-commissioned officers; that is, if boys only were accepted who adopted a military life from choice and not from necessity. Tough boys ought to be religiously excluded. Boys accepted should receive a good, sound, liberal English common-school education, one-half a soldier's pay, a full ration, and full clothing allowance. In return for these advantages the apprentice should be bound by his parents or guardians to serve faithfully the Government for a certain number of years, say, ten in all; that is, five years as an apprentice at school and five years in the ranks of the army following graduation. The school should be industrial and have manual training appliances; should not be regarded as a reformatory institution for the training of wild boys; but the class of boys should be carefully selected from those who have good homes and are well behaved in character and tractable in disposition. The graduate from this institution would give the army eventually a fine class of non-commissioned officers—an element that recent vicious legislation has deprived the army of."

I believe truly that here is the solution of the vexed question, and this would be my sixth and last recommendation as regards the non-commissioned officer, viz.:

6. To bring about a gradual education and supply of non-



commissioned officers, by means of the apprentice system as outlined above by Capt. Quinton.

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Doubtless all officers now in the army whose service is of more than a few years' duration, remember the numerous discussions that used to rage around many a post trader's fire about discipline, desertion and other allied subjects; and, doubtless, they remember that in the end two principal causes were always assigned for all the evils with which the service was cursed, viz.; "too much work" and "poor and insufficient food."

In any future discussion of these questions we can, I believe, leave these causes out of the argument entirely, as having no bearing on the points at issue. Recently a pound of fresh vegetables has been added to the ration, thus making of an already liberal ration the most liberal one on earth. Care has been taken to see that the soldier gets his ration in kind or in an equivalent. The soldier is no longer robbed of his bread to buy books for the post library, shade trees for the post, or gewgaws for the band. His ration is well cooked and served, and in many cases it alone affords him better fare than he ever gets in civil life. But this is not all. The canteen and the company amusement room as well as the bakery pour their quota of profits into the company fund to procure a variety of fare. It is not an unusual thing for a company in present time to spend from \$600 to \$1200 per annum on its table in addition to the Government ration. Surely the soldier is well fed. Any complaints to the contrary come from temporary causes extraneous to the modern system of messing soldiers, or from chronic "kickers" or grumblers undeserving of attention.

When it comes to a consideration of the question of work it will be necessary to define what is meant by this term, in order to avoid confusion. We can divide the physical exertion a soldier is, by orders, required to make, into two classes; 1. That which ensues from his profession, and may be called legitimate, such as drills, parades, care of arms and equipments, care of horses, guards, policing and details within the company, and, 2. That which does not necessarily ensue from his profession and is frequently called unnecessary. The latter is purely and simply unskilled labor, performed with pick and shovel, without compensation—a kind of labor, that, perhaps, the soldier had enlisted to avoid. Of the first class soldiers do not complain, and it can-

not be alleged that the purely legitimate work of soldiering, any more than the present ration and its administration, is driving men out of the service, or is one of the causes of decay in discipline.

No one will deny that a cavalry soldier has more of this class of legitimate work to do than any other soldier. With his horse, extra arms, etc., it can be demonstrated that the amount he does in three years will about equal the amount done in five years by a foot soldier. The facts being as they are we would naturally expect to find, if work were driving men from the service, the cavalry branch furnishing the largest percentage of desertions. To show that the very reverse is the fact, I invite your attention to the following table taken from the report of the Inspector General for 1893:

ARM OF SERVICE.	Number of Desertions.		Per cent of Total Strength.		Per cent. of No. of Recruits Received.	
	1892.	1893.	1892.	1893.	1892.	1893.
Cavalry .....	203	297	3.9	5.4	11.92	15.05
Artillery .....	242	277	7.2	6.3	22.94	22.25
Infantry .....	567	732	5.	6.5	12.37	20.29
Total .....	1012	1306	5.11	6.48	13.78	19.14

It may be urged that the results given in the above table are accidental. I, too, have asked this question, and have found my answer in the same Report of the Inspector General whose remarks and table I propose to quote without comment:

"Last year a table was presented showing some striking coincidences in the averages per company, organization. It was then found that where the greatest military activity existed, as shown by the marches made, there were the fewest desertions, there the lowest number of days lost by confinement and absence without leave, there the least number of trials, there the smallest number of men married, and there again the greatest number of men reënlisted and who served in their present organization over five years. This year's statistics [1893] do not contradict these facts, as shown by the table on next page, which exhibits the averages per organization of this and the preceding year."

I have but one desire in quoting these tables, and that is to prove that the cry of "too much work" has no foundation in fact, when we mean the legitimate work of soldiering, for with professional work and military activity as a maximum in the cav-

ally, we find the disturbing causes of discipline, and their outward manifestations at a minimum in this arm. Will we not have to reject our preconceived ideas, and frankly admit that desertion, confinement, trials and kindred evils come from want of work, rather than from an excess of it? "Satan finds some mischief still for idle hands to do," applies to soldiers quite as aptly as to anybody else. Feed him well and keep him busy, and we will find that the soldier will give but little trouble.

AVERAGES PER ORGANIZATION.	Cavalry.		Infantry.		Artillery.	
	1890.	1893.	1890.	1893.	1890.	1893.
Desertions. . . .	2.	2.7	2.4	3.2	3.7	4.4
Miles travelled. . .	536.	393.7	70.6	65.3	36.0	14.8
Nights in bed. . . .	6.7	7.5	7.7	8.5	6.9	7.4
Days lost by confinement. . . . .	282.	282.9	301.	310.7	322.	365.
Days lost by absence without leave. . . .	17.6	16.5	21.1	27.9	41.1	45.3
Men tried. . . . .	28.8	17.7	30.9	18.6	41.4	20.4
Men reenlisted. . . .	2.6	2.5	2.2	1.9	2.1	2.2
Men having served over 5 years in present organization. . . . .	8.4	6.7	7.	6.	7.6	6.4
Men married. . . . .	3.7	3.7	4.	4.	5.9	5.

When we come to consider labor disconnected from legitimate soldiering—that is, fatigue not within the soldier's own company, or under his own officers, the above figures do not apply. We have no data showing which branch of the service does the most fatigue. Subsequently I shall return to this subject of pick-and-shovel fatigue, and discuss its bearings on our subject of discipline.

Stating, then, as a fact that food and professional labor are not factors of the inefficiency of our rank and file, let us proceed in our examination of what are these factors, and how this inefficiency can be remedied.

For a number of years back the percentages of desertion have been large—so large, in fact, that our authorities became alarmed at the magnitude of the evil, and bent every effort to its suppression, oblivious of the fact that desertion is one of the consequences of a system of voluntary enlistment and oblivious also of the fact that neither the soldier nor the average civilian look upon this grave military offense as anything more than a mere peccadillo, by which the deserter evinces a characteristic Amer-

ican independence of character and a commendable contempt for a system by which one man can be "bossed" by another. Just as long as we continue our present methods of recruiting will we have desertions; for that system fills our army in hard times, and depletes it in flush times. Voluntary enlistments filled our army during the financial depression of 1893 so that recruiting had to be stopped. It is only natural that many of those who have enlisted during a personal financial stress should seek to get out when that stress is removed. Our authorities forget apparently that desertion affords the cheapest, easiest and most expeditious means of exit. With the average deserter the broken oath, the violated contract, the infringed law cut no figure; it is simply a case of "easy come, easy go"—of obligations lightly assumed and lightly thrown aside as circumstances warrant. General Washington's correspondence contains many references to this evil, which, at times, went on to such an extent during the Revolution as to threaten to seriously cripple his efforts. If such a state of affairs existed in a volunteer army waging a patriotic and popular war, it will certainly occur in a volunteer army in peace times. The evil can be minimized not suppressed. The War Department in its attempts to lessen the evil has placed itself in an unfortunate position—rather that of the suppliant begging the enlisted man to stay, than that of the dread Nemesis ready to punish him if he go. Congress has passed a law "to prevent desertions and for other purposes." Innovations have been introduced into the army with the ostensible purpose of bettering the condition of the soldier. Some of these possess merit, others do not. Some represent long-continued agitation by the true friends of the soldier for simple acts of justice; others are more in the nature of "crank" legislation and bribes to induce the enlisted man to continue in service until he can avail himself of one of the various means of exit, other than discharge at expiration of service, that have been devised under pretence of bettering the condition of our soldiers. In short, some were the work of educated professional soldiers who had made the study of the enlisted man a life work; while others were the work of theorists. None of us knows the enlisted man any too well. He is very far away from those who know him best. We can take a telescope and get a pretty good idea of a star that is very far away; but reversing the telescope only makes the object appear smaller and farther away. The the-

orists have been using a reversed telescope on the enlisted man.

• Good legislation has been outweighed by that of doubtful propriety and I am certain that a large majority of those in command of troops will agree with me that the result of these innovations, which I have heard called "Coddling and Army Tinkering" has been to make the enlisted man uneasy, unsettled and undisciplined, and to make the work of commanding him much harder and much more disagreeable. It is not necessary to enumerate these laws; it will be sufficient to point out their due effects.

Their effects are these: to give young soldiers exaggerated and wrong ideas of their "rights" and "privileges," and to lead them to discuss and assert them to the prejudice of good order and military discipline; to offer easy means of exit to good soldiers, and exceedingly difficult means to bad ones; to rid the service of that necessary leaven old soldiers; to create a dearth of material of which to make non-commissioned officers; to permit the successful gambler to quit the service on the proceeds of one "streak of luck" (although restrictions have lately been placed on discharge by purchase); to permit the soldier whose wishes and desires have been crossed to demand his furlough and discharge and to do it in a way that is galling to an officer of spirit. These laws have introduced a state of affairs in the army not entirely unlike that on board H. M. S. *Pinafore*, when things went along nicely only when the captain said: "If you please." The soldier is and ever has been a class apart. He is *sui generis*. We find recorded in the third chapter of St. Luke that there is contemplated for him a separate scheme of salvation. Regulations and laws for his guidance and improvement should be framed by those who are best acquainted with him, and who are serving with him constantly; never by those that are contemplating him through the reversed telescope. The prayer of every one in the army interested in discipline and its maintenance should be: "Deliver us from theorists"—for theory rather than experience has dictated the changes, well-intentioned but ill-advised, from which the army is suffering. Having succeeded in making it easier for a good man to get out of our service than to get into it, it is time to cry a halt.

It may be urged that those laws are so framed that not every man who desires his discharge is eligible—that his company com-

mander can in certain cases so make his endorsement that the application will be refused. True, but this does not help discipline any. A soldier that has expressed a desire to leave the service had better be assisted rather than thwarted in his desires. If refused, he becomes a man with a grievance and, in the end, the company commander who has tried to do his duty, will have to endure with whatever equanimity he can command the entering of this man's desertion in his (the company commander's) efficiency record. The tendency will always be to lean in the statement of character, etc., on the side of the man, rather than on that of the Government, but who that knows our officers will doubt that in the face of stern facts they will leave their efficiency records to take care of themselves while they satisfy their consciences. With his conscience on one hand and his record on the other the officer's position is not an enviable one. Better repeal the laws that operate as I have shown. Blot from the statute book all this pernicious legislation. Leave us if not better, at least as well off as we were before the hand of the theorists was laid upon us. The addition of the pound of fresh vegetables to the ration tends to contentment; the summary court makes justice swift, and both are accordingly aids to discipline. For these we are thankful; the rest can be repealed. Cease to tinker with the army; cease to coddle the soldier unless it be the intention to bid a long farewell to discipline.

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I would next endeavor to make this a truly representative and national army. With this end in view I would enlist only citizens and such foreigners as had shown an intention to become citizens of our country by taking out first papers of naturalization. I would require all that enlist to be able to read and write the English language. The age limit for a first enlistment is now by existing orders 30 years. Therefore, any one born anterior to 1864 is not eligible for enlistment. Most States I believe fix the minimum school age at 5 years. Any person who became of this age prior to 1869 is ineligible. In fact the eligible class comprises those that were free to begin their education between 1869 and 1878. We all know the merits of our public school system, and that a common school education is within the reach of most boys, and that the same state of affairs existed in 1869, and has existed ever since that date. Any young man eligible for enlistment that cannot read or write must be pretty poor material of

which to make a soldier. His ambition is too limited; his spirit too sluggish to be of use to us. The times are passed when goals are unbarred for such as will enlist. We have established a moral and a physical standard for our recruits. We are scrutinizing them so closely, requiring certificates of good conduct, etc., to such an extent that any young man may be proud to know that he has passed the scrutiny of the recruiting officer and been deemed worthy of enlistment. Now go one step farther; give us better material on which to impose our discipline; or, in other words, establish a patriotic and educational standard in addition to the moral and physical ones now in force.\*

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I have when discussing the non-commissioned officer stated that I would either abolish the extra duty system, or reorganize the pay table so that the sergeants would always be the financial superiors of the private, even when the latter is on extra duty; and I have shown that, in order to secure this, the pay of first sergeants must be in the vicinity of fifty dollars, and that of sergeants thirty-two dollars per month.

On second thought, I would do both; abolish the extra duty system, and raise the pay to the above figures.

If I had the power I would establish a permanent divorce between "soldiering" and non-military fatigue. It has always been a reproach to our army that the soldier can handle the pick and shovel far better than the sabre and bayonet. I recognize the fact that there are many soldiers who wish to do nothing but "soldier," and that there are others who in order to "get out" of the legitimate work of the soldier, will gladly work—with extra duty pay if possible, without it if needs must be. The mistake that we have made hitherto has consisted in making both these classes—the willing and the unwilling—do an inordinate amount of fatigue. This fact has operated to the detriment of the

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\* Since writing the above the principle I contend for has been fully recognized. General Order No. 30 of this year publishes an Act of Congress "To regulate enlistments in the Army of the United States," of which the following is an extract: "Hereafter all enlistments in the army shall be for the term of three years, and no soldier shall be again enlisted in the army whose service during the last preceding term of enlistment has not been honest and faithful; and in time of peace no person (except an Indian) who is not a citizen of the United States, or who has not made legal declaration of his intention to become a citizen of the United States, or who cannot speak, read and write the English language, or who is over thirty years of age, shall be enlisted for the first enlistment in the army."



discipline of the class whose pride inclined them to be soldiers rather than novices.

Nevertheless in the existence of these two classes I see the remedy—which lies in the creation of a quartermaster's corps with detachments at each post to which should be transferred those men that we now find on the extra duty list. This corps should do all the work now done by extra duty men, old guard fatigue and special fatigue, except policing, and—I would let the soldier who is satisfied to "soldier" do so to his heart's content.

The Inspector General reports 3937 men on extra and special duty, but does not give separately the number of either class. If 40 per cent. of this number are on extra duty the number will be about 1575 men; if 50 per cent., the number will be 1968 men—enough to give each garrisoned post 16 and 20 Quartermaster's Service Corps men respectively. Even if the line were reduced to form this corps there would be a loss per company of only four or five men—about the number whose services are lost now by permanent extra duty details. The gain in discipline and the improvement in drill would more than compensate for the loss in strength.

I would be opposed to any system by which the members of the troops of the line should have any other interests than those of the Government. The company tailor and the company shoemaker should belong to this Service Corps. I would have the cook rated as such, and get his pay from the paymaster all in pay proper. As soon as a man begins to make money by the exercise of his trade, like the tailor or shoemaker, the other men get jealous, grumbling ensues, dissatisfaction exists, discipline is struck a serious blow. The evil can be obviated by an elimination of all interests from the life of the soldier save those of his country.

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The desire for strong drink is instinctive in human nature. A writer on the subject of drunkenness says: "And, however degrading, demoralizing and pauperizing the vice of drunkenness may be it is important to remember in all our thoughts concerning it, that it is the outcome of a craving innate to human nature, whether civilized or savage, and that there has been no period in the world's history, and no nation on its surface, in which one or other, and often several simultaneously, of the many natural or artificial nerve stimulants have not been employed." We



cannot annihilate this craving. If we have but one axiom in our service it is that the American soldier will drink. In this country, philanthropy, education and law are at work trying by a wise recognition of this law of nature to control the appetite for intoxicants, while at the same time, ignorance, in defiance of this law, endeavors to stifle the appetite. The necessity for the control of this evil is manifest in the fact that most crimes with which the law has to deal can be directly traced to drink. This is notably true of the military service. I think I am safe in the estimate that ninety per cent. of all military offenses are due to an indulgence of the appetite for strong liquor. As soldiers will undoubtedly continue to indulge their appetites, discipline will continue subject to the attacks of the drunkard. The problem, therefore, becomes simply: getting the greatest amount of control of the vice so that the damage resulting from the vice to discipline shall be a minimum. Any device by which drunkenness in a garrison is diminished may be regarded as a means to discipline. All our efforts should be directed towards control. Attempts to eradicate drunkenness from the army are not deserving of serious attention.

The unspeakable abominations that go hand in hand with intemperance are all committed by soldiers when out from under military control, when they are, either with or without permission, away from garrisons and in the hands of those people who make it a business to cater to their appetites and vices, and who fatten on the soldier's hard earned pay. It must be confessed that in some manner, not necessary for us to investigate, the business of saloon-keeping near military posts is in the hands of a very low, evil and disreputable lot—frequently dishonest and always demoralizing to the class to which they particularly cater. In their so-called "saloons" orderly and disciplined soldiers, yielding themselves to their unconquerable appetites make lapses and plunge into a seething pit of vice. The companions they meet, the life they lead, the amusements they seek there, are all tainted and corrupted with vice. The awful apologies for liquor with which the soldier attempts to stifle his conscience and drown his appetite are alike dangerous to mind and body. He is plied with liquor as long as he has money. Unconsciousness comes mercifully to the relief of tottering mind and shaking body. In this condition he is frequently beaten, robbed, thrown out of the haunts where with money he was the welcome guest, and left to

get home the best way he can; an offender against military law, an object of pity to his fellow-men, and of loathing to himself. I appeal to my brother officers and ask if this is an exaggerated picture of the evils of drunkenness in our ranks prior to 1889.

That such a state of affairs does not exist to-day at every post in the country is due to our canteen system. The military authorities are necessarily the enemies of the saloon-keeper. The latter is ever trying to get his degrading touch upon the men, the former are always trying to keep the men from him. The canteen is the culmination of this struggle, and solely in the interests of humanity, good order, and military discipline, our authorities have invaded the territory of the saloon-keeper and are continuing the struggle there. The war has been carried into Africa. The lesser of two evils has been chosen, and by supplying the most innocent and least harmful of intoxicants, and by regulating its use and by preventing its abuse, an effort is made to control the evils of intemperance. This is in the true interests of discipline, looking as it does to the prevention rather than the punishment of crime.

Let me describe the system a little more in detail, first premising that this system is the result of deep and long-continued consideration of the best means of lessening drunkenness—a consideration too by those whose knowledge on the subject is profound, and whose interest in the soldier is vital; while those who decry the system are those who are profoundly ignorant of the true object and real workings of the canteen, and who, seizing on one feature incidental to the system, harp on it, blindly refusing to believe the one great fact, that the canteen is doing a good and moral work for the soldier.

This is what the authorities have attempted to do: they have fitted up in nearly every post pleasant rooms, with comfortable chairs, tables, etc., provided billiard tables, games and cards, made provisions for selling at moderate cost light lunches, selected and placed on sale at a small profit a good stock of soldier necessities not provided by the Government, prohibited all games of chance, and—in a separate room for that purpose only, sell light beer only, to the soldiers under certain restrictions. Evil companionship by this method is reduced to a minimum. Ardent spirits are not sold and consequently not imbibed to goad our men to acts of madness and desperation. A canteen steward, a non-commissioned officer, has authority to preserve order and to prevent over-

indulgence on the part of individuals, and he is quick to use his authority.

Most officers have no desire to be even remotely in the liquor business, and there is a sacrifice always made when the officer takes these duties of canteen officer upon himself. No officer would be willing to assume these duties unless he could see that the enlisted man, in whom nobody but officers are particularly interested, was benefitted by the canteen. All who are acquainted with the workings of the system unite in saying that unmixed good is the result. Small profits are made, and these eventually go back indirectly to the men, by being given to the company fund to procure a more extended bill of fare.

The success of the system was established from the very first, and no one knew it better than the saloon-keeper who, at once, with much vociferation, began to decry the system. The unholy alliance of Puritan and blackleg was again declared; the saloon-keeper through cupidity, the temperance "crank" through ignorance are to-day the only enemies the canteen has.

Just contrast the picture of the frontier groggery, as I have drawn it, and all will admit that it is not overdrawn, with the picture of the canteen as given above. All unprejudiced persons must agree with me that the service is benefitted by the downfall of the first and the rise of the second. But we do not have to depend upon a contrast of pictures. Statistics, figures that never lie, have in the case of many posts proved that trial by court-martial has fallen off ten, twenty, even fifty per cent. by the introduction of the canteen. I verily believe we are justified in our belief that the canteen has come to stay.

The fact that the results of the system are wholly good has not prevented the harshest kind of criticism, and many bitter attacks upon the canteen. The influence of its enemies has been exerted in Congress and the permission to sell beer in prohibition States has been revoked. The canteen officer has to obey the order of the War Department, the proprietor of the groggery does not obey the State law, and there is no disposition on the part of the State authorities to make him. The result is that in the towns near posts liquor is freely sold and the canteen bar is closed. The soldier after being reclaimed is as a result of this blind, pernicious, idiotic temperance agitation, permitted to relapse to his former state and become again the victim of the frontier thug.

I would, therefore, as a measure productive of discipline, extend the sale of beer to embrace the canteen of every post in the country, and would do this simply in the spirit of General Orders No. 51 of 1890, granting permission to the commanding officer of a post to permit the sale of light beer "whenever he is satisfied that the giving to the men the opportunity of obtaining such beverage within the post limits has the effect of preventing them from resorting for strong intoxicants to places without such limits, and tends to promote temperance and *discipline* among them."

The moment it ceases to promote temperance and discipline all officers having the good of the soldier at heart will be against it, but as long as it has this result all friends of the soldier should hold their peace. Let the opposition to the canteen come from the disgruntled saloon-keeper—not from Christian advocates of temperance. But in the face of all outside opposition the officer will continue to do his duty, amply satisfied if some poor fellow is benefitted and won from the vicious associates the absence of the canteen in the past has encouraged him to form.

\* \* \*

The average soldier is fond of reading. In former years books and papers were bought from the post fund, and in this way the soldier always found plenty of reading matter well kept up and renewed; and, as books became worn out or damaged, funds available to replace or rebind them. The War Department in its wisdom, and mainly as a result of the agitation for more and better food for the soldier that I have mentioned in another part of this paper, abolished the post fund and charged the Quartermaster's Department with the duty of buying papers and periodicals for the post libraries, the supply being regulated by a yearly allowance of about \$12 per company.

This allowance is barely sufficient to supply current newspapers and magazines.

The increase of the books of the post library practically ceased with the abolition of the post fund. The books that were there then are there now. They have been thumbed over, and read and reread until they are literally worn out. In the library at my present post not over twenty-five per cent. are in a condition to be read, and these are the least interesting among them, the familiar red binding of the Ordnance Department publications predominating. Those that a soldier desires to read are *non-est*.

There are no funds for new books, or for binding and thus preserving the few that remain. The condition of our post libraries is shameful, and the sorrowful part is that no post official has any way of remedying it, and apparently no one else cares.

I was once instrumental in collecting in the East for the company of which I was then a lieutenant, a box of reading matter, the contribution of my friends, consisting of paper-covered novels, magazines, illustrated papers, and a few bound volumes. I have the statement of a veteran first sergeant that that box of books was the best aid to discipline he had seen for years. I shall not attempt to state here the number of weeks the company went without a trial, a confinement, or even a case of drunkenness; during which the roll of the company might have been called with few absentees in the company reading-room at times when the men were off duty. What obtained in that company will obtain in any other. Therefore the post library should be recognized as a potent factor of discipline and should have sufficient public funds diverted to it by some means or other to produce a steady supply of good books—fiction, travels, biographies and professional works, in addition to the magazines and papers already supplied. More men would spend evenings in barracks quietly reading, and the frontier bar-rooms would suffer a marked decrease in their patrons.

\* \* \*

I am decidedly in favor of giving the good soldier a good conduct badge, to be worn, after it is once earned, during good behavior, and to be forfeited by bad conduct. Soldiers like decorations. See the pride with which they wear marksmen's buttons and sharpshooter's crosses. I would make this natural feeling of vanity serve a good purpose for discipline. I believe if a soldier has earned the right to wear a good conduct badge he will strive to keep it. He will try to be a better soldier and by trying will succeed. It is a very simple experiment to try. No harm can come of it, and I believe much good will be the result.

\* \* \*

For final recommendation: Give greater initiative to captains. It is a well recognized principle that this class of the commissioned force hold the highest trust in armies. To them are given in our service fifty or sixty men of various nationalities, all sorts of antecedents and early training, different moral bents, and

varying capacities for good and evil. The captain's task is to make out of this heterogeneous mass of humanity a tactical unit that will "at all times, in peace or in war, be of the greatest use and credit to the country." His task is to train their minds, bodies and tempers with this end in view. To him, and to him only, must we look for discipline. On the results obtained depend that captain's reputation and future success. No one has greater interest that these results be good. Therefore I say, recognize his inherent *right* to command his company. Any attempt on the part of any one who hampers him in his efforts should be eliminated. No extension of the squadron or battalion system should be tolerated that robs him of one jot or tittle of his authority. His men should know no other chief. He should be recognized as the one that clothes, feeds and cares for them, and the one that will punish if necessary. Give the captain full swing. Recognize as legal and proper anything he does that promotes the efficiency and discipline of his command, and hold him to a rigid accountability for results. Consult the captains whenever steps directly affecting the enlisted man are contemplated. Get their views rather than those of bureau officers in Washington, and then, perhaps, much of the haphazard legislation and regulations of recent days will never be repeated.

The War Department urges the exercise of discretion on the part of commanders in the trial of their men. This is done particularly in General Order No. 73 of 1892, in which occurs the following: "In the discharge of this duty [the exercise of greater discretion] they may not only deprive unworthy soldiers of privileges, but take such steps as may be necessary to enforce their orders." This is in the interests of discipline and it is something in which all officers with the proper views on discipline will co-operate. I would make it more apparent that this discretion should be exercised by captains more than by any other officers. I would go a little further. I would give captains the authority when a soldier has committed a breach of regulations, to call the offender up and give him the option of a summary court trial or punishment summarily by the company commander.

I have known a modification of this system to be used with beneficial results. The punishments given were extra kitchen, stable, special post, and company fatigue. The results were beneficial in that while the bad men were punished by more work, the good ones were favored with less. The writer can recall in-



stances where proper and well merited punishment by confinement has lost its effect as an example by reason of duty being harder on good men in consequence thereof. By the method outlined above the good men have an incentive to observe the requirements of discipline when they see a system of punishments that actually makes duty lighter on them—something not achieved by any system of punishment of offenders outside their companies. In addition the power to punish, at once and without cumbersome legal forms, prisoners for insolence to officers, refusal to work, etc., should, as an aid in the maintenance of discipline, be distinctly conferred by orders.

In the system of company punishment advocated by me it will be observed that there is contemplated no restraint of the man in his liberty except while at work, no infliction of corporal punishment. Still at times it may be necessary for a company commander to proceed to extreme measures to enforce his discipline. Just what an officer can legally do is shrouded in mystery. We have seen recently a captain tried for arbitrary punishment of his command. Yet that captain did only what I have frequently seen done. The following extract from a general order of the War Department (53 of 1842) seems pertinent to our subject, and could with propriety be republished as defining exactly how far an officer may go in summary punishment :

"But it may be said in the case of mutiny, or conduct tending to this great crime—that it is necessary to cut down, on the spot, the exciter or ringleader. *First* order him to be seized. If his companions put him into irons or confinement, it is plain there is no spread of the dangerous example. But, should *they* hesitate; or should it be necessary in any case of disobedience, desertion or running away—the object being to secure the person for trial;—as always to repel a personal assault, or to stop an affray—in every one of these cases any superior may strike and wound; but only to the extent clearly necessary to such lawful end. Any excess, wantonly committed beyond such measured violence, would, itself, be punishable in the superior. No other case can possibly justify any superior in committing violence upon the body of any inferior, without the judgment of a court,—*except that it may sometimes be necessary by force, to iron prisoners for security or to gag them for quiet.*" The latter italics are the writer's. "To iron" as there used is considered to be a generic term including any securing of the person. With the doctrines

enunciated in this order clearly understood by both officers and men I am inclined to think there would be an improvement in discipline. The officer would feel his arm strengthened when most needed in his efforts to maintain discipline, and evil offenders would feel increased respect for that authority that could, when necessary, punish severely and promptly.

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The writer had recently brought to his attention a number of "Maxims for Officers" sent by Washington to Col. William Woodward in 1775, at the latter's request. These maxims are so characterized by thorough knowledge of the subject based on common sense that I append them as a fitting summary of my subject :

- "1. Be strict in your discipline.
2. Require nothing unreasonable of your officers and men ; but see that whatever is required be punctually complied with.
3. Reward and punish every man according to his merit, without partiality or prejudice.
4. Hear his complaints.
5. If they are well founded, redress them ; if otherwise, discourage them, in order to prevent frivolous ones.
6. Discourage vice in every shape.
7. Impress upon the mind of every man, from the first to the lowest, the importance of the cause, and what it is he is contending for.
8. Be easy and condescending in your deportment to your officers ; but not too familiar, lest you subject yourself to a want of that respect which is necessary to support a proper command."

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Now suppose that all the recommendations I have made in this paper were carried out, what would be the result ? An American army, free from coddling, tinkering and the innovations of the theorists, wholly given up in the line to soldiering, with no interests but those of the country, with drunkenness at a minimum, with rational amusements for the well-behaved, and swift punishment for the ill-behaved ; an army in which the units would be under the unhampered guidance and control of their chiefs, whose reputation must stand or fall with that of their units—or, in other words, a representative American army under perfect discipline.



## THE PRELIMINARY EXAMINATION: WEST POINT.\*

BY FIRST LIEUT. C. DEW. WILLCOX, 2D U. S. ARTILLERY.

*Le Maître de Philosophie.*

N'avez vous point quelques principes, quelques  
commencements des sciences ?

*Monsieur Jourdain.*

Oh ! oui, je sais lire et écrire.

Le Bourgeois Gentilhomme.

### I.

IN any investigation bearing on the Military Academy considered as a school, its peculiar character as such must ever be kept in mind. So peculiar is this character, that there is no risk in saying that the Military Academy is in a certain sense not a factor in the general system of education of our country. It exists for certain definite purposes ; it accomplishes these purposes in its own way, and neither these purposes, nor their accomplishments, constitute for the vast majority of young men, to be academically trained, a subject of the least interest to them, or to their parents and guardians.

What these purposes are, this audience does not need to be told. It is not necessary to dwell on the special field covered by them. But, for the sake of completeness, let it be briefly stated that our object here is to train young men for the military service of their country, and not in the least to educate them, in the ordinary sense of that word. Furthermore, in order to carry out the ends for which the Academy was founded, and which form to-day the only reason for its existence, our pupils are obtained in a special way, over which the Academy has no control whatever. Lastly, any person satisfying certain well-known conditions, is free to become a candidate. That one or two of these statements may appear questionable, is freely admitted. For example, many of our eminent graduates have exercised in the past, a marked influence on the progress of education in this country. But from the point of view of this paper, such influence is to be regarded as a bi-product. And as such, it does not make against the propositions stated.

\* Read before the West Point Branch of the M. S. I., November 15, 1894.

We may say then with perfect truth, that the Academy occupies, and will always occupy, a unique position among the institutions of learning of this country, in this, that whereas these may be coördinated, graduated, or otherwise related to one another, it must necessarily stand alone. If compared with Yale or with Harvard, for example, we may say that it is no educational institution at all. To put the case in a nutshell, our pupils are here not for subjective but for purely objective reasons. If the Academic Board were empowered to select the candidates for commissions, then would the Academy be truly independent in every sense of the word. Fortunately for the Board, it does not possess that power. The Academy is therefore practically independent in all respects but one, and that one of fundamental importance: it must accept the material that is found to possess certain qualifications. My purpose this evening, is, from a certain point of view, to discuss these qualifications.

Let us, however, look about us for a moment. We have to take here, every year, an hundred boys or so. No classification is made; none of the material sifted. It is left to the subsequent effort of the officers on duty here, to form this material, and out of frequently incongruous elements, to shape a homogeneous and symmetrical result.

To complain of this incongruity would be futile. It arises in all likelihood from the fact already stated of our isolation in the educational system of the country. In reality, we get our candidates, as it were, by accident. In many instances, the appointment comes suddenly to a boy who perhaps has never thought of following the profession of arms. And in any case, it is a fact that there are relatively very few appointments, for a very large population. Hence it is that very few boys grow up with the idea that they will enter upon life through the Military Academy, while thousands on the other hand intend to enter upon it after a college training. Be this as it may, we have the fact, if a guess may be hazarded, that not five out of 100 candidates, have intended from the outset to enter the Academy, and have qualified themselves accordingly. Whether this defect, for defect it is, can be overcome, I do not undertake to say.

Let us now place in contrast with the requirements of admission, the very serious requirements that a cadet must satisfy before he is declared fit to be an officer. In passing from the one set to the other, a difficulty presents itself; the difficulty of re-

ducing to a common measure, two practically unrelated quantities. Although candidates enter at the average age of 18½, that is at an age when they may be reasonably expected and required to have considerable mental equipment, yet relatively almost nothing is required of them. It has been well said that the preliminary examination serves only to weed out the absolutely incapable, and even then it does not always succeed. That is to say, we are working here to-day between very wide limits, and that in a time that cannot but be called short, if we reflect on the depth of the foundation to be laid.

Now, it is not believed that this state of affairs is intentional. It is a growth, and better still, an accidental growth. Admission requirements are fixed by statute, and hence contain within themselves no germs of development. They must be altered by the same agency that created them, and once fixed, their tendency is to remain fixed. On the contrary, course-requirements, if that expression may be used, do grow, do develop, and there is, theoretically at least, no limit to which they may not go under an able and active professor. For even if the range of studies be, as in our case, fixed by statute, these germs of growth nevertheless exist, and may, without exceeding the statute, be given a development the exact extent of which will depend on circumstances. And that is just what has taken place here.

If so humble a figure is permissible, we have for years been pulling on a cord one end of which has been and is yet, fixed, with a view to stretching it to a point which is ever and ever receding from us. Supposing that we do not stop pulling, we must finally, either break the cord, or else take up its fixed extremity and set it farther forward in the desired direction.

The history of the preliminary examination is soon told. First established by Congress in 1812, it required that the candidate should be "well versed" in reading, writing and arithmetic. No change was made in these subjects until 1866, when English grammar, U. S. history, and general geography, were added. In 1870, the examination was made written. That is to say if we leave out the first eleven years of the Academy's existence, during which its story is one of chaotic disorganization, the requirements of admission, originally of the simplest character, have been changed but once, and then only by the addition of elements equally simple.

To comment on this fact, astonishing though it is, is merely

to waste time. It is not a waste of time, however, to trace it to its origin, for by so doing, its real nature is set forth. And when we have accounted for the facts in any given case, we are prepared to measure accurately the conditions to which they owe their existence.

Statistics on the condition of educational matters in this country about 1812 have not been accessible, and therefore no positive statement can be offered, of the reasons that led Congress to fix the requirements of admission as it originally did. But what that condition was, we can readily imagine. The country was poor, and thinly inhabited. Well instructed teachers, especially in the higher branches of learning, were largely foreigners. Not a single technical school of any sort was in existence, and a main object of the few colleges was to educate clergymen. There were few if any good schools for boys. "As late as the beginning of this century, there were schools in country districts in which arithmetic was not taught at all."\* "He was an exceptional teacher [in colonial times] who possessed a knowledge of 'fractions' and the 'Rule of 3,' and if some pupil of rare genius managed to master 'fractions,' or even to pass beyond the 'Rule of 3,' then he was judged a finished mathematician."† "The arithmetics of this time [1776-1820] were little more than Pandora's boxes of ill-formed rules to be committed to memory. Reasoning was excluded from the realm of arithmetic, and memory was made to rule supreme."‡ "As late as 1818, one of our American compilers of text-books, Daniel Staniford, actually stated in the preface, as a recommendation to his book, that 'all mathematical demonstrations are purposely omitted to clear illustrations of the rules by easy examples, and such as tend to prepare the scholar for business.'"§

Under the conditions illustrated by these quotations, therefore, it was perfectly natural for Congress to pitch on what every one would know a little of—the three R's—as reasonable requirements of admission. Let us notice—for it is significant—that Congress could not reasonably pitch upon anything less. It was then, this or nothing, for anything more meant exclusion from the school. Any higher test destroyed the thing tested. Orig-

\*Cajori, "The Teaching and History of Mathematics in the United States." p. 9.

†Id., *ibid.*

‡Id., p. 49.

§Id., p. 50.

nally, therefore, the low standard of admission to the Academy was justified, thoroughly justified, not only and merely for the year in which that standard was first set up, but for many years afterward. For we can easily conceive that the progress of the so-called popular education was necessarily slow, and that the new States admitted to the Union from year to year, reproduced approximately the conditions prevailing in 1812, and thus measurably kept down the average qualifications of great numbers of the candidates annually presenting themselves for examination.

It follows that the present standard of admission is a relic of the past,—an inheritance from an age when the question was, not how high a standard can we have, but what standard can we have at all? To-day, neither the necessities of the Academy nor the state of the country, justify its retention. On the face of the matter, the standard that was right and proper nearly a century ago, is not right and proper now. The historical aspect of the question under discussion, is however of secondary interest only. We have to deal with the present; nay, more than that, we must begin to look forward. As long as we keep our present requirements of admission, how much more may our present courses be safely developed? Are we not to-day practically at the limit, so far as range is concerned? Whatever may be the answers to these questions, and to others that might be put, they all involve the possibility or impossibility of raising the standard of the preliminary examination. We have therefore before us a plain question: Assuming that the standard will be raised if it can be raised, does the state of education throughout the country justify an increase in the requirements for admission?

## II.

If we compare the minimum and the average age of candidates on reporting, with the age of graduation from the high schools of the country, both public and private, certain conclusions follow. These ages are for us here, 17 as a minimum, and  $18\frac{1}{2}$  as an average; for graduation from public high schools the minimum is 18 and for private, from 18 to 20. No account is taken of the common and lower schools, for at the average age of passing from them to the high schools, a pupil would be 3 or more years below our minimum. Now, if candidates have had any school training whatever up to the time when they report,

or up to within a year or two of this time for ages greater than 17-18, it is clear that they must have obtained it in the high schools of the country. It results, therefore, that these are of especial interest in the present discussion, for it is upon them that we must build, if we are to build at all.

Let us first inquire into their distribution. This inquiry is pertinent, because of the argument so frequently made that the different parts of the country enjoy very unequal advantages in the matter of education; and that consequently any elevation of our standard of admission would hurtfully affect all but a small minority of the older and richer states. Of course this argument is based on a false conception of the purpose for which this Academy exists; but unsound and mischievous as it is, it is continually put forward, both in Congress and out of it, and it rarely fails to carry weight whenever and wherever it may be expressed.

## PUBLIC HIGH SCHOOLS.

Name of Division.	No. of Schools.	No. of Pupils [Male White].
North Atlantic .....	845	32,548
South Atlantic .....	166	3,820
North Central .....	1448	39,721
South Central .....	197	4,060
Western .....	117	3,429

## PRIVATE HIGH SCHOOLS.

North Atlantic .....	531	19,261
South Atlantic .....	363	8,751
North Central .....	305	10,564
South Central .....	380	8,362
Western .....	135	2,438

The latest data available in the investigation of this distribution are contained in the report of the Bureau of Education for 1890-1891, published in 1894. In this report, the United States are grouped as in the census, into certain great geographical divisions that lend themselves readily to purposes of comparison. For example, the North Atlantic Division includes New England and the neighboring States of New York, New Jersey and Pennsylvania. The South Atlantic, and the South Central Divisions include all the Southern States, while the North Central and the Western include all the Western States. Of these divisions, the North Atlantic and possibly the North Central, are the only ones

that, by popular hypothesis, would not suffer from raising the standard of admission. And at first blush, the hypothesis would appear to be justified. For if we compare the numbers tabulated below, the advantage seems to be overwhelmingly in favor of the two divisions mentioned.

Certainly the 52,000 of the North Atlantic, the 50,000 of the North Central, when compared with the 25,000 and the 6000 high school pupils of the South and the West respectively, would show that the former divisions far outstrip the remainder of the country in matters educational. But such a comparison would be unfair. Indeed, the data given do not represent the distribution of high schools except geographically. To make a fair comparison, we must obviously take population into account, and in the Southern States, only the white population. For it is evidently illogical, in determining the distribution of high school facilities to include a class of inhabitants not reached by this distribution. While in some Southern States, the blacks outnumber the whites, and form in all the remainder of them, a very large percentage of the population, in none of them, save the District of Columbia and South Carolina, do the black pupils amount to more than a small fraction of all the high school pupils. To include the negroes, then, would be to give a totally incorrect indication of the spread of school facilities in those States in which negroes exist in large numbers. For this reason they have been omitted in the Southern States, and for the sake of exact comparison, they have been omitted throughout, in company with the Chinese and the Indians. But this omission is of no consequence so far as north and west are concerned. For example, in the North Central Division, it makes a difference of less than 0.004 pupils per 1000 of population. In the North Atlantic Division, the effect of the omission is somewhat greater, 0.02 per 1000 of population.

These conditions premised, and taking as unit 1000 of population, we have the following results:—

## PUBLIC HIGH SCHOOLS.

North Atlantic Division.	No. of white pupils per 1000 of pop...	1.90
South Atlantic Division.	" " " " "	0.68
North Central Division.	" " " " "	1.82
South Central Division.	" " " " "	0.55
Western Division.	" " " " "	1.20



## PRIVATE HIGH SCHOOLS.

North Atlantic Division.	No. of white pupils per 1000 of pop.	1.12
South Atlantic Division.	" " " " "	1.57
North Central Division.	" " " " "	0.48
South Central Division.	" " " " "	1.13
Western Division.	" " " " "	0.85

These tables show at a glance, that where the public school system is weak, the private is strong, and reversely; more specifically, that while the Southern States are inferior to the remainder of the Union in public schools, they are much superior in private, so far as distribution is concerned.

Adding these results together, we have:—

## PUBLIC AND PRIVATE HIGH SCHOOLS.

North Atlantic Division.	No. of white pupils per 1000 of pop.	3.02
South Atlantic Division.	" " " " "	2.25
North Central Division.	" " " " "	2.30
South Central Division.	" " " " "	1.68
Western Division.	" " " " "	2.05

It is submitted that from the point of view of this paper, these results are not unfavorable. New England and adjacent states surpass the rest of the country, but in a ratio that is by no means excessive. In three of the five divisions containing over one-half the population of the country, the distribution is for the purposes of this argument, uniform. For over 47,000,000 of inhabitants, the ratio is over 2:1000, and substantially not exceeding 3:1000. The belief is ventured that these results are encouraging; in other words, it is believed that an increase in admission-requirements would not, as usually assumed, injuriously affect all but a small number of states. The difference in educational advantages as measured by high schools, between the various parts of the country, is not so great as generally imagined.

Averages, however, tell only average truth. They may not tell a useful truth at all. Thus, in the case before us, it is pertinent to inquire into the distribution of the average itself. For evidently, in any one of the great divisions given, some states may so excel in educational advantages, as to credit other states of the same division with a standard to which these are not in the least entitled. Let us then investigate this question with respect to the least favored state. Defining such a state to be one in which the ratio of high school pupils to 1000 of population is smallest, and applying the test, we have the following table:

PRELIMINARY EXAMINATION: WEST POINT. 259

NORTH ATL. DIV.			SOUTH ATL. DIV.			NORTH CENT. DIV.			SOUTH CENT. DIV.			WESTERN DIV.		
State.	Pupils per 1000.	1000's of Pop.*	State.	Pupils per 1000.	1000's of Pop.*	State.	Pupils per 1000.	1000's of Pop.*	State.	Pupils per 1000.	1000's of Pop.	State.	Pupils per 1000.	1000's of Pop.
1 N. H.	5.85	376	1 D. C.	5.65	155	1 Ohio	3.20	3585	1 Miss.	2.34	545	1 Nev.	3.85	40
2 Me.	5.38	660	2 Del.	3.07	141	2 Iowa	3.14	1902	2 Tenn.	1.99	1337	2 Col.	2.42	405
3 Vt.	5.22	332	3 Ga.	2.83	979	3 Mich.	2.60	2073	3 Ala.	1.90	834	3 Cal.	2.31	1112
4 Mass.	4.66	2216	4 N. C.	2.78	1056	4 Wis.	2.33	1681	4 Tex.	1.71	1746	4 Utah	2.04	206
5 Conn.	3.74	734	5 Va.	2.38	1021	5 Minn.	2.27	1297	5 Ky.	1.40	1591	5 Ore.	2.02	302
6 N. Y.	3.00	5224	6 S. Ca.	2.07	462	6 Neb.	2.09	1047	6 La.	1.40	559	6 Wash.	1.81	341
7 R. I.	2.73	338	7 Fla.	2.03	225	7 Ill.	2.00	3769	7 Ark.	0.92	819	7 Ida.	1.59	82
8 N. J.	2.50	1397	8 Md.	1.84	827	8 Kans.	1.96	1377				8 N. M.	1.30	143
9 Pa.	1.64	5149	9 W. Va.	0.23	731	9 Mo.	1.66	2529				9 Mont.	1.12	128
						10 Ind.	1.64	2147				10 Wyo.	0.58	60
						11 S. D.	0.69	328						
						12 N. D.	0.49	183						

\* The next higher 1000 is taken in all cases but South Carolina and Idaho.

† No private schools whatever are reported from West Virginia; the ratio 0.23 is therefore, on the face of it, incorrect. Nevada's ratio (3.85) seems to be unduly great.

From this table we see that:—

4	States (counting D. C.)	have over	5	pupils per 1000.
1	"	has between	5 and 4	" " "
6	" (counting Nev.)	have	4 " 3	" " "
17	"	" "	3 " 2	" " "
14	"	" "	2 " 1	" " "
5	" (counting W. Va.)	" "	1 " 0	" " "

Or, 28 out of 47 states have over 2 pupils per 1000 of population, and these states furnish by far the greater number of candidates. Of the fourteen states having between 1 and 2, per 1000, ten are nearer 2:1000 than 1:1000. It is concluded that the average is, on the whole, fairly well distributed.

This is, however, not the only conclusion. Two additional results at least, attract attention. Of these the more important is that, with the exception of a few states of small population (like Delaware and Nevada), the more populous states have the greater number of pupils, both relatively and absolutely, under high school instruction; or, the states that furnish the greater number of candidates, also furnish, so far as high schools go, the greater facilities for educating them. The next conclusion in degree of importance is that in what are supposed to be the more backward parts of the country, opportunities of instruction are not only fairly well distributed, but they will compare not unfavorably, all things equal, with those of the more fortunate parts of the land. Both of these conclusions bear directly upon the initial proposition, that in general, candidates, if they have any instruction at all, must get it in the high schools, both public and private.

Such being the distribution of high schools, both by great divisions and by states, it remains to be shown that candidates have come under its influence. At the same time, it is particularly desired to point out, that no proof of this proposition is necessary in the general argument of this paper: if opportunities of instruction exist wide-spread, we have a right to force candidates to use them, whether they have done so in the past or not. This contention is held to be entirely sound. If, however, it can be shown that candidates have availed themselves of these opportunities, to just this extent will the general argument be unexpectedly strengthened.

For the last ten years exactly, a record has been kept in the adjutant's office, of the school history of the respective candidates, as they presented themselves year by year. When begun,

in the spring of 1884, it was taken of the classes actually under instruction; and in all cases, it shows what sorts of schools have been attended and for how long. In short, this record furnishes a complete statistical account of the training of the persons to whom it applies. In collating the data, the number of cadets and of successful candidates that had been to public high schools, was first taken; then, the number of those that had been to private, but not to public, high schools; and lastly, of those that had been to normal schools, but to no sort of high school. The object in all cases was to find the reach of school advantages. In many instances candidates had attended two, and in some few cases, even all three of the kinds of schools enumerated. Such cases were however for the reason just given counted only once. And for the same reason, the same analysis was made of the unsuccessful candidates. In respect of time spent at school, it should be added that no period less than a month was taken into account. The results are tabulated on next page, and on account of their interest, are also represented graphically.

From this table we see that of 1682 candidates, 1299 or 77.2 per cent. had attended high schools. Of those successful the percentage is 77.5, and of unsuccessful 76.6. It should be recollected that among the latter are to be found those rejected by the medical board, as well as alternates whose principals were successful.

Over three-fourths then of all candidates for the past ten years have of their own free will availed themselves of high-school instruction. That is, not only is this instruction fairly well spread, but it reaches the classes from whom the greater number of candidates are drawn.

These results acquire special significance if brought face to face with the subjects usually studied in high schools. Obviously, the arguments so far brought forward are pointless, useless, unless these subjects are directly available for examination purposes. Now, it is precisely because they are available, that the question of distribution has been gone into with so much detail. All the high schools in the country teach Algebra and Geometry, Latin, History, and others of the so-called English branches. Many of them offer French, German, Greek, Physics, Chemistry, and some of them even go into Physiology and Civil Government. Of these subjects, those of special interest to us, as being those on which an elevation of standard would bear, are just

262 PRELIMINARY EXAMINATION: WEST POINT.

those that are most generally taught. While French and Chemistry, for example, are offered only in certain schools, Algebra is offered in all of them. Some of these studies may be regarded as luxuries, others as necessities. The necessities are found everywhere.

CADETS UNDER INSTRUCTION, MARCH 5, 1884.

Class.	High School.		Normal School	Total School.	Total School %.	College.	Number in Class.
	Public.	Private.					
1884	14	8	7	29	78.3	16	37
1885	24	10	2	36	87.7	12	41
1886	44	18	7	69	77.1	36	88
1887	45	13	15	73	72.2	39	101

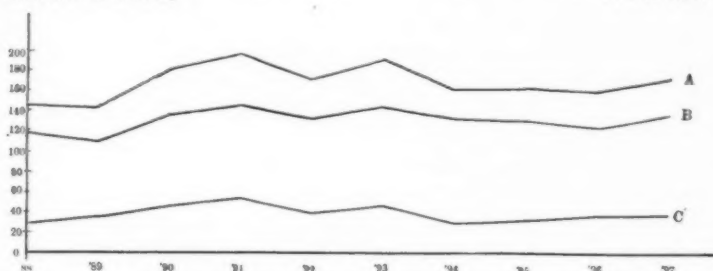
CANDIDATES ADMITTED.								CANDIDATES NOT ADMITTED.							
Class.	High School.		Normal School.	Total School.	Total School %.	College.	Number admitted.	High School.		Normal School.	Total School.	Total School %.	College.	Number.	
	Public.	Private.						Public.	Private.						
'88	52	16	14	82	83.6	39	98	18	10	7	35	74.4	12	47	
'89	50	11	11	72	75.7	30	95	21	7	9	37	77.0	17	48	
'90	67	15	16	98	76.5	39	128	18	5	14	37	71.1	16	52	
'91	71	8	22	101	78.9	43	127	30	8	4	42	60.8	27	69	
'92	50	10	14	74	73.2	31	101	31	8	18	57	82.6	10	69	
'93	45	14	12	71	73.9	32	96	50	5	17	72	76.5	30	94	
'94	52	6	8	66	80.3	26	82	42	8	16	66	82.5	17	80	
'95	59	5	16	80	80.8	34	99	40	3	7	50	78.1	10	64	
'96	55	12	16	83	72.8	40	114	28	3	9	40	86.9	7	46	
'97	60	6	20	86	79.6	36	108	38	6	6	50	76.7	17	65	

While the facts just stated are held to be sufficiently well-known to require no further explanation, it is, at this point, neither uninteresting nor uninteresting to make a comparison between the favored and the unfavored parts of our land, in respect of the number of students of Algebra and of Geometry. For it is the possible introduction of just these very subjects, that will excite the bitterest opposition from those who stick to it through thick and thin, that any increase would not exclude New England, but would exclude the South and the West.

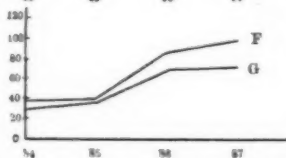
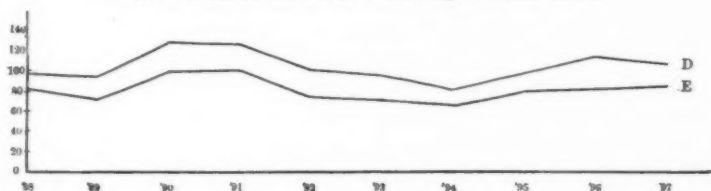
# PRELIMINARY EXAMINATION: WEST POINT. 263

With the same units and limitations as before, we have:—

North Atlantic Division, No. of students of Algebra per 1000.....	1.46
South Atlantic Division, " " " " .....	1.32
North Central Division, " " " " .....	1.15
South Central Division, " " " " .....	1.04
Western Division, " " " " .....	1.17
North Atlantic Division, No. of students of Geometry per 1000.....	0.90
South Atlantic Division, " " " " .....	0.55
North Central Division, " " " " .....	0.48
South Central Division, " " " " .....	0.43
Western Division, " " " " .....	0.66



- A. Total of candidates reporting.
- B. Total of candidates having attended high or normal schools.
- C. Total of candidates that had not attended high or normal schools.



- D. Total of candidates admitted.
- E. Total of candidates admitted who had attended high or normal schools.
- F. Total of cadets under instruction March 5, 1884.
- G. Total of cadets, etc., who had attended high or normal schools.

These results may fairly be called striking, not because the numbers are themselves extraordinarily large, but because these numbers are practically uniform, expressed in terms of the unit of 1000 of population.

They become still more striking when we compare them with the total number of high school pupils, in terms of the unit just mentioned. For then we have:—

North Atl. Div., percentage of high school pupils studying Algebra...	48.34
South Atl. Div., " " " " " "	58.66
North Cent. Div., " " " " " "	50.00
South Cent. Div., " " " " " "	61.90
Western Div., " " " " " "	57.17
North Atl. Div., percentage of high school pupils studying Geometry...	29.80
South Atl. Div., " " " " " "	24.44
North Cent. Div., " " " " " "	20.86
South Cent. Div., " " " " " "	25.05
Western Div., " " " " " "	32.19

It must be borne in mind that all the results brought forward in respect of high schools are three years old. There is no reason for believing that they would be traversed by later data. While however, it would be very difficult as yet to cover the past three years, it is legitimate in an inquiry like the present one to forecast the future, and that in spite of the fact, that of all things, to prophesy is one of the most dangerous. Whether the requirements of admission be increased or not, the steps taken or to be taken in the matter of secondary education bear directly on the questions under discussion. No apology, therefore, is needed for touching upon them to-night.

The National Council of Education in July, 1892, appointed a committee of ten, with President Eliot of Harvard as chairman, to report on the subject of secondary school studies in the United States. After due deliberation the committee on Nov. 10, 1892, appointed conferences of ten members each to report on the following subjects respectively: Latin; Greek; English; other modern languages; Mathematics; Physics, Astronomy and Chemistry; Natural History; History; and Geography. These conferences were composed of professors and of school-teachers drawn from all parts of the country, and representing all sorts of institutions, from high schools to universities. For example, the conference on Mathematics included Professor Newcomb as chairman, but it also included teachers in boys' schools.

To these respective conferences was sent a list of questions covering the points on which it was desired that report be made, and in some sort fixing the limits thereof. In due time, the conferences met and made their recommendations to the Committee of Ten. These formed the basis of a general report by this com-



mittee, which report, together with the special recommendations just mentioned, was published by the Bureau of Education in 1893.

Of these recommendations, some possess no present interest for us: Greek, for example, will never be a requirement for admission, and the same may probably be said of Physics, Astronomy, Chemistry and Natural History.

I shall, therefore, in respect of these, merely point out their bearing on the general mental development of candidates, and pass on to the more detailed, though necessarily very brief, consideration of those that are of practical interest to us.

And first, of English: the character of the recommendations may best be grasped by considering the requirements of admission to College, resulting from the course recommended. These are: the study of master-pieces of English Literature; parallel reading of related works; some acquaintance with literary history and criticism; and largely, *the ability of the candidate to express himself clearly and correctly in all of his examination papers.\** It is supposed that the pupil has already received training in Grammar and Rhetoric. It is well to note here that the standard implied is neither ideal nor theoretical, for many colleges have already reached it.

Closely connected with English is the subject of foreign (modern) languages. The conference on this subject recommended the introduction of the elective study of either French or German at the age of *ten*; in any case, that such study should form part of the high school course. Here again is it worthy of note that many schools both public and private teach French or German or both, and that many colleges require to-day some knowledge of either or of both as alternatives of Latin or Greek.

Perhaps the most valuable and to us the most interesting recommendations are those made on the subject of mathematics. Like the house that defied the storm, West Point is built on a rock, and that rock is mathematics. Here, if anywhere, we might feel ourselves under compulsion to move slowly and surely in the matter of changing the admission requirements. It is therefore significant that the conference,—of which, be it recollected, Professor Newcomb was chairman,—recommended a course in arithmetic to begin at 6 and to end at 13, and one in concrete geometry for grammar schools, to be given in connection with drawing.

\* Italics ours.

The conference further recommended that systematic algebra should be begun at 14, and demonstrative geometry at the end of the first year's algebra, to be carried on two years. It expresses the belief "that if the introductory course in concrete geometry has been well taught, both plane and solid geometry can be mastered at this time," and that "boys going to a scientific school might profitably spend a year on trigonometry, and some of the higher parts of algebra, after completing the regular course in algebra and geometry." These higher subjects accordingly find a place in the schedule carefully drawn up by the Committee of Ten to express their idea of the amount and nature of the work to be done in schools.

The recommendations on geography were of a revolutionary character. The suggestions made, if carried out, will involve a more or less radical change not only in the methods of teaching this subject, but also in the conception of its nature. For example, "their definition of the word makes it embrace not only a description of the surface of the earth, but also the elements of zoölogy, astronomy and meteorology, as well as many considerations pertaining to commerce, government and ethnology." Whether we should ever be willing to follow the conference through its changes, is more than doubtful. But even if it is certain that we shall not, it is not amiss to note the resulting extension of general knowledge, the formation of habits of observation and of accurate statement. These are positive results, available in any branch of knowledge, that is, we could turn them to account in other subjects, both before and after admission. If, however, we may for the present be justified in taking a more or less negative view of the recommendations on geography, we shall not be justified in taking such a view of those on history. The conference on this subject was of the belief "that the time devoted to history and the allied subjects should be materially increased," and arguments are presented in favor of this increase. "They state strongly their conviction that they have recommended 'nothing that was not already being done in some good schools, and that might not reasonably be attained wherever there is an efficient system of graded schools,'" and "that the teaching of history should be intimately connected with the teaching of English."

It is, perhaps, within the knowledge of all our readers that one of the remarks most frequently made in criticism of officers

of the army bears on their lack of historical knowledge. It is only comparatively lately that a mere acquaintance with the bare outlines of our country's history has been thought necessary as a condition of entrance. The establishment of a course in history is of still more recent occurrence. And yet there is a whole branch of military science to which a knowledge of general history is a necessary introduction. It is not maintained that an examination covering more than our own country will furnish this essential, but it is maintained that if the general standard of historical studies is raised in accordance with the recommendations given above, the range of these studies at the Academy can be greatly increased. And of course that means higher requirements of admission in history.

Such is a very brief and imperfect outline of so much of this celebrated report as directly concerns us. Its significance and value lie in the fact that it unquestionably constitutes a new point of departure in the development of secondary schools. A high but not unattainable standard has been set before them. We shall here at the Academy feel the effect of this, whether directly or indirectly. But if we have it in our power to achieve greatness, shall we wait to have it thrust upon us? Bearing as they do directly upon admission to the Academy, are not the recommendations of the Committee of Ten worthy of serious consideration? If, being only recommendations, they have apparently received disproportionate attention to-night, it is because they really form an important, a necessary part of the subject in hand. It is as though a general advance had been sounded along the whole line, an advance that will sweep us along with it, whether we are aware of it or not. If the question of secondary instruction is important to us, the probable development of this instruction cannot be ignored.

If now we group together the circumstances under which our entrance standard was originally fixed; the distribution of high schools, their reach over possible candidates, their courses of study, and the high standard to which these are tending, will any one maintain that our entrance requirements are to-day in accord with these conditions? Is it not reasonably demonstrated that an affirmative answer must be given to the question that has served as a foundation for this whole argument? Does not the educational condition of the country justify an increase of the requirements of admission?

## III.

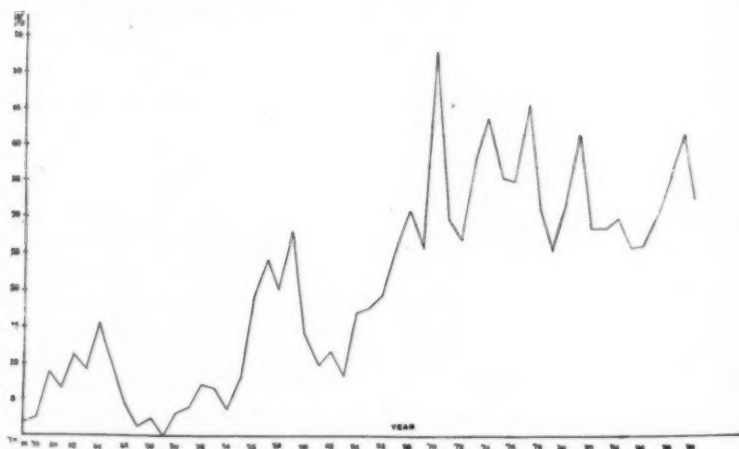
To say that the Academy holds a unique position as an educational institution does not mean that we shall not profit by the experience of other schools. Particularly is this statement true when we reflect that until the beginning of the fourth year, cadets receive no academic instruction whatever in purely military subjects. During the first three years of his career the cadet is undergoing mental training—training that of course he can turn to immediate account in his subsequent profession, but still, mental training not in itself professional. We are therefore at liberty to compare this institution with others in those respects in which they all agree. This comparison may obviously be made with any college or university, but will be limited in this discussion to technical schools, which, like the Academy, are giving training as a foundation for professions of responsibility. And of course the comparison involves only conditions of admission.

Mere examination of the accompanying table is all that is needed. But certain questions suggest themselves. If these schools, training men for responsible professions, find it safe to exact more than mere rudiments, why should we not find it safe here? Is it not worth while to make the experiment? Are we in a position to say that it would be hurtful? The better colleges and universities from time to time add to their admission requirements, thereby marking their faith in the soundness of the educational growth of the country. Might we not with safety follow their example, especially when we reflect that, unlike them, we do not depend on popular favor for existence, that we do not depend on students to meet expenses? It is clear from this table that all these requirements bear a distinct relation to subsequent courses. Now if we look at our standard after admission, if we reflect upon the effort necessary to graduate, upon the character of the profession of arms even in our own unmilitary country, we are forced to the conclusion that *our* entrance requirements bear *no* relation to subsequent efforts. The object of an entrance examination is, or should be, to measure acquired knowledge, and to test fitness for further training. Ours does neither. For example, our backbone being mathematics, our examination calls for no knowledge of this branch, and most certainly is no test of the candidate's ability to pursue it. Let us take English, and let us take it because the cadet will have to use his native speech with accuracy and flexibility in many varied subjects. Roughly

ENTRANCE REQUIREMENTS OF CERTAIN SCIENTIFIC SCHOOLS, WITH THOSE OF THE NAVAL AND THE MILITARY ACADEMIES.

[1894.] School.	Age	LANGUAGES.			HISTORY.	MATHEMATICS.				PHYSICS.	CHEM.	DRAWING.	REMARKS.
		English.	French.	German.	Latin	Arith.	Algebra.	Geom.	Trig.				
Sheffield Scientific (Yale).	15	Whitney's Gr. or equivalent.			4 books (Cæsar, 2 Vergil, 1 Computatory.)	To include metric system.	To include metric system, binary, analysis, etc.	Plane, solid, spherical.	Construction and use of tables; solution of triangles.				Candidates "are urged to make themselves acquainted with History of England."
Lawrence Scientific (Harvard).	—	To include reading of standard works designed to give some insight into composition on a subject drawn from same.	Translation of Same as ordinary prose; French, subject drawn from same.	Same as French.		U. S.; English.	Through quadratic equations	Plane.		Optional.	Optional.		Advanced mathematics may be offered. French and German alternative.
Mass Ins. Technology.	17	Composition in one hour of an essay, correct in all respects, on some prose at sight. Subject drawn from standard authors.	Ability to translate in all respects, on some prose at sight. Subject drawn from standard authors.	Same as French.		U. S. (or Ancient.)	To include metric system.	Plane, 5 books.				Free-hand.	After 1894, solid geom. or advanced algebra. "It is the intention of the Faculty to require both of these at no distant day." French and German alternative.
Columbia School of Mines.	18	Good English in all ex-amination papers; composition on some subject drawn from same as in Mass. Ins. Tech.	Ability to read simple French; elements of grammar.	Same as French.		U. S.	To include metric system	Plane, solid, spherical.	Plane; use of tables; solution of triangles.				Geometry is also required.
Rose Polytechnic, Terre Haute, Ind.	16	Grammar.				U. S.	Required	Through quadratic equations					
Worcester Polytechnic, Worcester, Mass.	16	Grammar. Composition Ability to read on some subject drawn from works required to be read.	Ability to read ordinary prose; sight reading.			U. S.	To include metric system	Through Plane, quadratic solid, trigonometry, ratio & proportion.					Geometry is also required.
Rensselaer Polytechnic, Troy, N. Y.	15-20	Grammar, essay of 150 words on subject given during examination				U. S.	To include metric system	Through Plane, quadratic books of equations, Chauvenet.					Geometry is also required.
Naval Academy.	17-22	Reading, writing, spelling				U. S.	Arithmetic, of 3 or more variables.	Simple					Geometry is also required. Spelling throughout considered in marking papers.
Military Academy.	17-22	Reading, writing, spelling (grammar).				U. S.	Arithmetic.						Geometry required.

speaking, all that we ask is that a candidate shall not make more than a certain percentage of errors in spelling, reading and elementary parsing. Surely it will not be claimed that our standard is what it ought reasonably to be. The examination is not even competitive. The Government is ready to give, and does give, a life position in the most honorable and responsible of professions, not to the boy who can read and write and cipher better than his neighbor, but to any boy who can read and write and cipher sufficiently well to escape being called a dunce. But suppose the examination were competitive: would that be enough? If present conditions are maintained any boy of ordinary intelligence can at short notice come up to our requirements; that is to say, we declare to the world that we have no special requirements for a highly specialized profession. In making such a declaration, are we doing our full duty to the service? Have we no rights of our own, no responsibility in the premises? Of course some one will object that even now many boys fail to get in, and conclude therefrom that we require enough. The premise is admitted, but the conclusion flatly denied. What if many boys should fail to enter under a higher standard? Is it our business to let in a great number of boys, or is it our business to get the best material possible? If there are every year so many failures both before and after admission, it is not because the entrance standard is too high, but because it is too low.



Fluctuation (per cent.) in numbers of candidates found deficient, 1838-1890.

In justification of this statement, let it be remembered that the number of failures depends on two things: the method of selection and the standard itself. The former is not under the Academy's control, but that it greatly affects the number of failures is self-evident. These two independent influences are combined in the preliminary test, and it is therefore distinctly incorrect to charge, as so many have charged, all the failures to one of them alone. For, if we examine the percentages of failures to total examined year by year from 1838 to 1890 inclusive, it will be found that these percentages follow no law whatever. Now were the standard alone responsible just the opposite would be true: some relation would manifest itself, by at least the absence of such great fluctuations as do exist.

The hypothesis of poor selection fully accounts for the results observed. But this indifference to selection is itself largely accounted for by the low standard of admission. For evidently, if the requirements do not exclude poor material, the field of selection is thereby extended so as to include poor material. Bad selection bears moreover not only on numbers of candidates rejected, but also on numbers of cadets found deficient. In no other way can we rationally account for the great fluctuations in these, as observed from year to year. Nothing therefore can be more illogical than the cry that the standard of the Academy both before and after admission, is too high, and nothing can be more reasonably certain than that this cry is traceable not to our severity so much as to our laxity, in so far as laxity and low standard of admission are identical terms.

Let us be honest in this matter: instead of using the power that is clearly ours, that it is our duty to exert in forcing the worst candidates to come up to a right standard, it has come to pass that we have sunk to the standard of the worst candidates. If this be the case, it follows that in range at least, our own standard after admission is adjusted to the abilities of the poorest candidates that succeed in entering. If, therefore, present conditions shall prevail, we either betray indifference to the possibility of improvement, or else stand alone in virtually declaring that this possibility is non-existent. And we shall be practically allowing the poorest material that political or other influence can send us, to limit our development by accepting the qualifications of that material as our point of departure.

It is a law in matters of education that the higher we rise in



the scale of institutions, the greater the influence exerted by any member of the scale on those below it. The higher schools react on the lower, but not conversely. This law is based on experience, and is indeed but a special case of supply and demand. Hence, if we raise the standard of admission, we shall find beyond peradventure that our raw material will be improved. We shall get better candidates, because, more effort being required to get in, only those who are able to get in will make the effort. These reflections are generally true; they are independent of all other considerations. But when not only the moral aspect of the case, but also independent and unrelated facts support the contentions of this paper, then there is no longer room for doubt: we ought to increase our requirements, but we can increase them, whether we ought to or not.

It may be objected to all that has been said so far, that it consists of destructive criticism merely. But destructive criticism is not necessarily unsound, and it is no part of its duty to point out corrections for the defects that come under its notice. Waiving all this however, the following schedule of subjects for entrance examination is submitted as the practical result of the discussion:—

Candidates are required to be well versed in reading, writing, and spelling; in English grammar and composition; in arithmetic to include the metric system; in the history of the United States; in the descriptive and the physical geography of the United States; and to have a fair knowledge of algebra to include quadratic equations; of plane geometry; of the more distinguished English authors, and of such of their works as may from time to time be announced; of the descriptive geography of the earth; and of general history.

Candidates may offer to be examined in drawing; in French, so far as to read ordinary prose; and in Latin, to include such works as Cæsar's Gallic War, and the simpler orations of Cicero. The subjects of the optional examination shall be weighted, and considered as counterbalancing some deficiency in the required subjects.

In the execution of this programme, no change would be suddenly made. This would manifestly be unfair to all concerned,—to candidates, who have a right to the serving of due notice, and to the Academy itself, which would need time in order to make a thorough study of the necessarily consequent changes in its

PRELIMINARY EXAMINATION: WEST POINT. 273

various courses. Unquestionably, fewer candidates would at first succeed in entering. But this is in itself no evil, and let it be remembered that fewer cadets would be found deficient. This statement is supported by the experience of the Academy itself, as may be seen from the following table, for since the preliminary examination was in 1870 made *written, i. e.*, more searching, not more difficult, the percentage of graduates to total admitted has risen.\*

1840-49, percentage of graduates to total admitted	48.90
1850-59, " " " "	48.26
1860-69, " " " "	62.85
1870-79, " " " "	54.00
1880-89, " " " "	50.41

The number of officers therefore, supplied to the service would in all probability be just as great as it is now, while the

TABLE SHOWING NUMBER OF CANDIDATES FROM EACH STATE AND TERRITORY, EXAMINED AND REJECTED BY ACADEMIC BOARD, FROM 1838 TO 1894, INCLUSIVE.

STATE OR TERRITORY.	Number examined.	No. rejected by A. B.	Per ct. rejected by A. B.	STATE OR TERRITORY.	Number examined.	No. rejected by A. B.	Per ct. rejected by A. B.
Alabama.....	172	53	30.8	Nebraska.....	40	16	40.0
Arizona.....	12	5	41.7	Nevada.....	19	12	63.2
Arkansas.....	82	35	42.7	New Hampshire..	61	10	16.4
California.....	79	20	25.3	New Jersey.....	134	24	17.9
Colorado.....	18	6	33.3	New Mexico.....	16	4	25.0
Connecticut.....	93	17	18.3	New York.....	762	160	21.0
Dakota.....	7	0	00.0	North Carolina..	196	58	29.6
Delaware.....	29	7	24.1	North Dakota....	5	3	60.0
Dis. of Columbia.	28	2	07.1	Ohio.....	459	111	24.2
Florida.....	30	7	23.3	Oklahoma.....	1	0	00.0
Georgia.....	106	55	28.1	Oregon.....	15	3	20.0
Idaho.....	15	10	66.6	Pennsylvania.....	618	139	22.5
Illinois.....	322	88	27.3	Rhode Island....	44	9	20.5
Indiana.....	281	85	30.2	South Carolina..	143	43	30.1
Iowa.....	130	34	26.2	South Dakota....	5	1	20.0
Kansas.....	73	26	35.6	Tennessee.....	259	86	33.2
Kentucky.....	252	72	28.6	Texas.....	118	46	39.0
Louisiana.....	107	31	29.0	Utah.....	16	2	12.5
Maine.....	98	14	14.3	Vermont.....	60	12	20.0
Maryland.....	158	46	29.1	Virginia.....	272	77	28.3
Massachusetts....	225	45	20.0	Washington.....	14	3	21.4
Michigan.....	159	46	28.9	West Virginia...	59	24	40.7
Minnesota.....	59	16	27.1	Wisconsin.....	126	32	25.4
Mississippi.....	130	40	30.8	Wyoming.....	18	7	38.9
Missouri.....	227	73	32.2	At Large.....	612	77	12.6
Montana.....	13	5	38.5				

[This table was kindly furnished by Professor Bass.]

\*Very large classes were graduated in the decade 1860-69. The war probably sufficiently accounts for this.

CONSOLIDATED TABLE OF STATISTICS, RESPECTING CANDIDATES, 1838-1890.

Year.	Number Appointed.	Rejected by Acad. B'd.	Rejected by Med. B'd.	Appointments Cancelled.	Declined Appointment.	Failed to Report.	Admitted.	% Rejected by Acad. B'd.	Graduated.	% Graduated.
1838	132	2	1	1	1	16	111	1.77	56	50.4
39	91	2	1	1	6	8	76	2.55	39	51.3
1840	106	8	2	1	4	8	84	8.68	25	29.8
41	131	8	..	1	1	7	114	6.56	41	36.0
42	144	17	0	..	..	9	109	13.4	59	54.1
43	77	6	8	..	..	3	60	9.09	38	63.3
44	96	14	1	..	..	5	75	15.7	38	59.7
45	98	9	1	..	..	5	81	10.0	43	53.1
46	121	5	1	..	3	9	103	4.63	44	42.7
47	84	1	3	..	3	3	74	1.33	42	59.7
48	84	2	..	..	1	..	81	2.41	43	53.1
49	95	..	2	..	1	..	88	0.00	52	59.1
1850	98	3	2	1	..	2	90	3.22	46	51.1
51	81	3	..	..	..	7	71	4.05	34	47.9
52	102	7	3	..	..	2	90	7.22	49	54.4
53	97	6	1	2	..	5	83	6.74	38	45.8
54	120	4	1	..	2	7	103	3.74	27	26.2
55	99	7	7	..	1	4	80	8.05	22	27.5
56	101	17	4	..	8	6	72	18.97	41	56.9
57	132	26	9	..	..	7	82	24.07	70	66.3
58	108	19	4	2	1	7	75	20.21	28	37.3
59	91	26	..	..	..	5	60	27.9	25	41.7
1860	84	12	..	..	..	..	72	14.29	27	37.5
61	148	13	2	2	..	23	108	10.74	68	63.0
62	96	11	..	..	..	4	81	11.84	41	50.6
63	126	9	3	..	5	10	99	8.33	63	63.6
64	101	15	..	..	1	12	73	17.04	54	74.0
							7368	1480	277	
							111	642	4744	

[This Table was kindly furnished by Professor Bass.]

work of getting rid of the unfit material would be put where it properly belongs, and would cease to be a drag on the Academy itself. But this particular effect,—the admission of fewer cadets,—would more than probably be only temporary. The invariable law of such cases would at once begin to operate; prospective candidates would work up to the higher standard and in a few years, this difficulty, if difficulty it be, would cease to exist. To all objections that might be raised on this score, it is a sufficient reply that the changes giving rise to them are in the interest, I shall not say of the Academy, nor of the service, but of the candidates themselves.

“If we could only combine with our material, your ability to make students work!” once exclaimed Prof. Brush to an officer present in this audience to-night. While it is not in the nature of things that his wish should ever be realized, there is nothing to prevent us from realizing it here. Let but the standard of admission be raised, and the ideal of the Yale professor will become with us an accomplished fact.

## ENGINEERING ASPECT OF A DEEP-WATER ROUTE FROM THE GREAT LAKES TO THE OCEAN.

BY CAPTAIN D. C. KINGMAN, U. S. CORPS OF ENGINEERS.

TO provide for the common defense, and promote the general welfare, are two of the important objects enumerated in the preamble of the Constitution of the United States, for which it was ordained and established. Therefore in considering any great public work which the Nation may undertake, under the powers granted it by the Constitution, it is impossible (from the stand-point of a military engineer at least) to ignore the bearing of such work, if it has any, upon the question of the public defense.

In any war in which the United States may engage, where the region of the Great Lakes shall become a theatre of operations, the power to navigate these lakes and to pass to and from them to tide water, will be a matter of the greatest importance and value. True, it may be claimed, that the only country with which we might become engaged in warfare which would enable the Great Lakes to be used as a hostile frontier would be Great Britain; and it is often urged that there is very little danger of the two great English-speaking nations ever again engaging in war with each other. To this may be replied, that we are not any more nearly related to England now, than we were in 1776 or 1812, and that there are still questions between us which are very far from settlement. The lake frontier might also become a theatre of war in the case of hostilities with any country in alliance with Great Britain,—true, in this case, it is not unreasonable to hope that we might ourselves discover an ally who would transfer the theatre of war to another quarter of the globe.

The treaty of 1817 between the United States and Great Britain limited each party to an insignificant naval force on the lakes. At that time the country on both sides was almost undeveloped. Since then the changes have been marvelous. Upon our side of the line the changes have been in the direction of the growth of cities, construction of railroads, and the general development of manufacture and commerce. On the other side of the line, while there has been great growth in the directions above

enumerated, they have also taken care that their means of defense should, in a measure at least, keep pace with the temptation to attack them.

The construction of the St. Lawrence and the Welland canals, have opened a path-way, small and inadequate it is true, for British vessels to the chain of lakes. It may not be generally known that as long ago as 1886, Great Britain possessed more than 50 vessels of war drawing less than nine feet of water, and more than 111 vessels drawing less than 12. Three of the largest of these vessels being iron-clads. The 50 small vessels could now pass easily into Lake Erie, and with the completion of the work now in progress on the St. Lawrence canals, the whole fleet, and all the other vessels that they have constructed since 1886, of corresponding draft, could be assembled on the upper lakes. To meet and oppose them, we have nothing that could prevent them from levying contributions upon every city upon the lakes from Ogdensburg to Chicago, or from reducing them to ashes if they saw fit. To be sure we have on the upper lakes a fine fleet of merchant vessels, but without guns to arm them or forts to defend them, they would merely be added to the booty. Therefore any public work which tends to put us upon an equality with Great Britain in our future ability to defend our side of the Great Lakes cannot fail to be a work of great importance to the common defense.

That the opening of a navigable route of adequate capacity, lying wholly within our own territory and subject to our protection and control, would be a measure of inestimable value is obvious upon a mere statement of the case. The necessity for it, and the abundant uses that would be made of it have been so often pointed out, that I will not attempt to develop the subject further on these lines, but will pass at once to the particular considerations which I have assigned myself, that is to say, the Civil Engineering aspect of a deep-water route from the Great Lakes to the Ocean.

Numerous attempts have been made to connect the Great Lakes with certain Western rivers, and thereby secure a water-route to the sea through the main trunk of the Mississippi.

In some instances these efforts have simply resulted in the formulation of projects, in others the work proposed has been accomplished, and in still other instances the work of construction is now in progress.

Formerly work of this kind was generally undertaken by chartered companies, or individual States, but of recent years almost all of these works have fallen into the hands of the General Government. Included in the three classes that I have enumerated may be found :

1st. A proposed route by canal from Duluth to the Mississippi River near St. Paul.

2d. The Fox and Wisconsin Route by river and canal from Green Bay to Prairie Du Chien,—once actually opened but now practically abandoned, as a through route.

3d. The Illinois and Mississippi Canal, now under construction, which is designed to furnish a navigable waterway, seven feet deep from Chicago on Lake Michigan to the Mississippi River near Rock Island.

4th. The Illinois and Michigan Canal originally constructed by the State of Illinois, which with the Illinois River forms a water route from the southern end of Lake Michigan to the Mississippi at Grafton. It afforded a six foot navigation for vessels of not over 18 foot beam.

The works now in progress by the United States in connection with those of the city of Chicago will ultimately make this a navigable route for the largest class of steamboats that are in use upon the river.

Then there is the Wabash and Erie Canal which connected Lake Erie at Toledo through the Wabash River with the Ohio. Like most of the older canals it was designed for a special class of small boats.

Finally there may be mentioned a project now under consideration, to connect Lake Erie by canal with the Ohio River near Pittsburg. There may be others, but I have mentioned enough to show that the subject has been pretty thoroughly considered, and that it is highly improbable that there now remains undiscovered any particularly available canal-route between the lakes and the river. But wherever these canals are located and however they may be constructed, they must belong to one of three classes. They may be of depth and lock capacity sufficient to permit the passage of the kind of vessels that navigate the lakes, in which case they simply extend lake-navigation to the river,—or else, while lacking depth for lake vessels, they may have width of locks sufficient to permit the passage of river steamers, in which case they simply extend the river navigation



to the lakes ; or finally they may lack both depth and width of lock, and so be navigable only by a special class of small boats not in general use on lake or river. In this case they do not extend either the lake or the river navigation. They simply form, as a railroad might, a means of transportation between them. They may be economical and advantageous,—doubtless they often are, but they are entirely outside of the matter under discussion.

But why is it, in the first case at least, that a canal of ample capacity can simply extend lake navigation to the river ? It is because of the unsurmountable obstacle of the river itself.

The Ohio, the Upper Mississippi and the Lower Mississippi are all under improvement, and when we see the object aimed at in this improvement it at once becomes evident that these rivers can never become available for such ships as now navigate the lakes and the ocean.

In the improvement of the Mississippi River it is proposed to obtain a low-water depth of not less than ten feet from the Gulf to the mouth of the Ohio, of not less than eight feet from the mouth of the Ohio to St. Louis, and ultimately of not less than six feet from St. Louis to St. Paul, though at present efforts are directed on this portion of the river to securing a depth of not less than four and one-half feet.

In the improvement of the Ohio, it is proposed to secure a depth of not less than six feet at extreme low-water from Pittsburg to the Mississippi.

The absurdity of constructing a twenty-foot canal to connect with a six-foot river, as a through route, ought to be manifest to any understanding. True, it may be urged that the river is not at its lowest stage all the time, but is generally at a higher level, and would often have a depth more than sufficient for the largest class of vessels found on the lakes. To this it may be answered that when the rivers are high the current becomes very rapid, and they offer many very serious obstacles to the progress of a sea-going vessel. Moreover the owners of valuable and expensive ocean vessels would certainly hesitate to send them on long river voyages into the heart of the country, with a reasonable probability of their being caught by the falling water and so stranded and perhaps destroyed with their valuable cargoes, or at best held helpless prisoners for weeks or months, until released by the succeeding high-water. Finally it may be stated as a general truth that commerce over a long river route never

has and never will be successfully maintained by ocean-going craft.

The conclusion is irresistible therefore that a commercially successful deep-water route from the Great Lakes to the Ocean can never be constructed by the way of the Mississippi River and its tributaries.

In saying this I do not intend to disparage any of the works now in process of construction. They are all important and valuable for the purposes for which they are intended, and are doubtless well worthy of the national support which they have received. But in seeking a practical route for ocean vessels we must find one that is shorter and more direct to the Atlantic. In other words we must look for one near the eastern extremity of the lake system. This leads to the consideration of a deep-water route through the chain of lakes itself; for this system in its natural state is not without many and serious obstacles to navigation. The Great Lakes are in general of ample depth, the obstructions being found in their connecting waters.

Commencing at Duluth, the first obstacle encountered, to a navigable route of not less than 20 feet in depth, are the falls and the shallows in the St. Mary's River between Lake Superior and Lake Huron; then the shoals in the Saint Clair River and in Lake St. Clair, and in the Detroit River, between Lake Huron and Lake Erie; and finally the rapids and falls of the Niagara River between Lake Erie and Lake Ontario. To consider these obstructions more in detail:—We find first a shoal near the head of St. Mary's River at Round Island upon which the requisite depth is not found. A channel 300 feet wide and 21 feet deep is now being dredged through it. It involves the removal of 90,000 cubic yards of bowlders, clay, sand and gravel, and will cost about \$40,000. Next is found the fall known as the Sault St. Mary. This has been overcome by a canal and lock giving 16 feet of water, and an improvement of the canal and the construction of a lock is now in progress which will increase the available depth to 20 feet. The estimated cost of this improvement was about \$4,700,000. Then there is the Hay Lake Channel, which originally had a depth of only eight or nine feet in the shoalest portion. A 16-foot channel through it is now completed, and work is in progress on a 20-foot enlargement. It is estimated that it will cost about \$650,000 to complete the work.

The next obstruction is in Little Mud Lake, where a channel

21 feet deep and 300 feet wide is being dredged through a shoal of bowlders, gravel, sand and hardpan, of which some 380,000 cubic yards will have to be removed, at a cost of about \$100,000.

Then at Sailors' Encampment and in Mud Lake are still other shoals through which a channel must be dredged, and upon which work is now in progress. This will clear the St. Mary's River, and no further obstacle is encountered till we come to the shoal at the foot of Lake Huron near the head of the St. Clair River, where a wide cut is being made through a shoal, involving the removal of about 250,000 cubic yards of material.

The next is the Saint Clair Flats, where originally but 11 feet of water was found. A canal has been excavated through them protected by timber dykes backed by the earth dredged from the cut. The length of the dykes is something over 7000 feet and the distance between them 300 feet. The original plan contemplated a depth of 13 feet of water, this has been increased to 16 feet for a width of 200 feet, and is now being deepened to 20 feet for the full width of the canal, and this depth is being extended in both directions and the cut gradually widened to 650 feet at deep water in the Saint Clair River, and 800 feet at deep water in Lake Saint Clair. It will require the removal of some 950,000 cubic yards of material, and will cost about \$175,000. The Saint Clair Flats Canal is a good example of how the first projects for the improvement of the lake navigation have had to be enlarged to meet the ever increasing demands of commerce.

The next obstruction in order is the Grosse-point Flats at the lower end of Lake Saint Clair. Through them a channel 20 feet deep and 800 feet wide is now being dredged. This was not considered a very serious obstacle for a 16-foot draft, but to secure 20 feet nearly three million yards of sand and clay must be removed.

The Lime Kiln Crossing in the Detroit River originally had a minimum depth of not over 13 feet, but it has been deepened by dredging, mostly in rock, to 20 feet for a width of 440 feet, and this improvement is now practically completed.

The last obstacle is the bar at the mouth of the Detroit River in Lake Erie, through which a channel 800 feet wide and 21 feet deep is now being dredged. All of the works therefore that are necessary to afford a through route, over all of the upper lakes, of a navigable depth of 20 feet have been carefully considered. Congress has with great liberality provided the means for

their execution, and they are now in progress in accordance with a maturely considered project. And such is the skill and energy displayed in the work that they seem certain to be completed at a cost which will be materially less than the original estimates. When these works are all finished there will be a deep-water route from Duluth to Buffalo, about a thousand miles, and Buffalo is the western terminus of the Erie Canal.

This canal, built by the State of New York, has proved no small factor in its development and growth. It affords a water route from Lake Erie at Buffalo to the Hudson River at Albany. It cost the State for its construction about fifty million dollars, and no one will deny that it was worth the price. It is about three hundred and fifty miles long, and is navigable by a special class of boats capable of carrying two hundred and fifty tons of freight. But its depth is only seven feet and its locks are only eighteen feet wide. So that a vessel of greater draft or greater beam cannot use it. The thought at once presents itself that this is the looked-for route to the sea.

It is only necessary to enlarge the canal to the required dimensions, and the problem is solved. This appears sufficiently easy to those who imagine that the construction of a ship canal consists simply in digging a ditch of sufficient size, inserting locks at the proper points to maintain the level, and then filling it with water and keeping it full. But unfortunately there is more to it than this.

While I am not prepared to say that it is impossible to build a twenty-foot canal along the line now followed by the Erie, I know that it would present a great many serious obstacles which would be enormously expensive to overcome, that it would present many special difficulties to navigation after it was finished, and finally that it is not the *best* route. In order to clear everything as we go, I will enumerate some of the more important objections to this route. In the first place it lies for nearly two hundred miles of its length along the southern water-shed of Lake Ontario. It therefore crosses all the lines of natural drainage. It intersects every rill, brook and river that flows into the lake from the south. For a canal only seven feet deep it is not a very difficult matter to cross a river by means of an aqueduct bridge, but where it is a question of a canal twenty feet deep the difficulty is enormously increased. In the first place the weight of water to be carried, which would be more than 1200 pounds to the square foot of surface, would require very heavy and massive

structures. Then it would be very difficult and would impose many hard conditions to bring a canal to a river in such a way as to enable us to hold its surface more than 20 feet above the level of high-water in the river.

In the case of small streams which a canal intersects, three things can be done; either the stream can be carried under the canal in a culvert, or else it can be carried over the canal by an aqueduct, or else it can be admitted into the canal as a feeder.

The first method is the one generally used in canals of moderate depth, but it would be very difficult and expensive to apply it in the case of a canal that was 20 feet deep. For it would generally involve the lowering of the bed of the stream for a long distance on each side of the canal, or else the use of an inverted siphon, which would be an objectionable expedient as it would be liable to be choked up by sediment, and thus dam the stream.

To carry the small stream over so large a canal would also be very troublesome, for it would require the use of a draw-bridge in order to permit the passage of ships in the canal; therefore, to admit the small streams into the canal would be in general the only practicable expedient. And this would be objectionable and often dangerous, because of the large amount of water and solid material that might be delivered in time of freshets.

One of the most serious obstacles that the Panama Canal had to encounter was the Chagres River, which it intersected a number of times in its course, and which presented a difficulty for which no very satisfactory remedy was ever found.

A deep canal ought to follow, and not cross, the lines of natural drainage of a country.

Another objection to the Erie route is that it requires many portions of the canal to be built in embankment, that is to have its water surface above the level of the country through which it is passing. This renders crevasses possible. They are not infrequent on the present canal, and the probability of their occurrence on a 20-foot canal would be increased at least threefold. When a crevasse forms, all the water runs out of the level, and leaves the boats that may be in it, high and dry. This does not do much harm to the small flat-bottomed canal-boats. They sit upright, and hold their cargoes well, until the break is repaired, and the level refilled. But an ocean vessel left in that condition would list over, its cargo would shift, and it would be racked and strained and perhaps destroyed.

A ship canal ought to be all in excavation. Then the Erie Canal passes through a perfect series of villages, towns and cities, to the growth and prosperity of which it has very largely contributed. This would make the land damages incident to an enlargement, excessively heavy.

A through ship canal ought not to pass through cities and towns. Finally, the Erie Canal is crossed by more than five hundred bridges,—an average of about one and a half to the mile. Many of them are railroad-bridges, and all of them have a vested right to be there. They would all have to be replaced by draw-bridges in the case of a ship canal; and they would be a terrible annoyance and delay to navigation.

A ship canal should be crossed by as few bridges as possible. If this route is not available it will be necessary to extend the deep water route to Lake Ontario, and Lake Ontario ought to be brought into connection, by a canal of our own, with the other lakes.

It is a simple matter of justice to the people living upon its borders.

This brings us to the last great obstruction to free navigation over the chain of lakes,—the Falls of Niagara.

A number of surveys, examinations and reports have been made upon the subject of overcoming this Fall by a suitable canal and locks. The last report was made by Captain Carl F. Palfrey, Corps of Engineers, only four or five years ago. He described two routes both of which started from the Niagara River near Tonawanda, and one of which meets Lake Ontario at Wilson, or 12 Mile Creek, and the other at Olcott, or 18 Mile Creek. The Olcott route is cheaper, and in every way more desirable than the Wilson route, and seems undoubtedly to be the one which ought to be selected. The total estimated cost of a ship canal of 20 feet depth, that is to say, one capable of transporting vessels drawing 20 feet, and having locks 400 feet long and 80 feet wide was \$23,617,900. Whether this estimate is too large or too small, and whether the kind of canal proposed and the dimension of locks proposed are the best that could be devised to fulfill the peculiar conditions of this case, are questions which can only be determined fully by a completed resurvey, and a careful consideration of all the questions entering into the subject of the construction of the canal.

There are some few engineering considerations which might



be mentioned, and some few modifications which might be suggested, but in the advance of such a survey, this would be all. The first question is, as to the size of the locks. The locks proposed were all the same size, namely 400 feet long, 80 feet wide and having a lift of 18 feet. The width would seem to be unnecessarily great for the purpose. An 80-foot width of lock for a ship canal would seem to be an inconvenient one, being too great for one vessel, and not great enough for two. 65 feet would seem to be sufficient, and would effect quite a saving in the cost of lock gates, and in the amount of water required for lockage.

The length proposed might have to be increased, although the largest vessel now afloat on the upper lakes is I think about 386 feet long, and has an extreme beam width of 45 feet. The lift might I think be advantageously increased. It would certainly tend to expedite transit through the locks, if the number of them could be reduced to a minimum. In considering the construction of the canal and lock to pass the cascades on the Columbia River, a Board of Engineers have recommended that a lock be made 462 feet long, 90 feet wide throughout, and having a lift of 24 feet. In designing a lock to connect the Mississippi River with Bayou Plaquemine, which is practically a tide water bayou connected with the Atchafalaya River and bay, it is proposed to construct a lock 300 feet long, 75 feet wide, and having a lift of 32 feet. This being the height to which the Mississippi River sometimes rises above tide-water at Plaquemine. No objection has ever been raised to this large lift, and it is not thought that it presents any unsurmountable obstacle to construction. This Bayou Plaquemine Lock is to be constructed upon a soft foundation; large groups of piles being used to support the gate-walls. One plan proposed to omit the side-walls, leaving the natural slope of the earth in place of them. This plan would of course increase the amount of water used in a lockage; but in this particular case the supply of water is inexhaustible. Another plan proposed to construct the side-walls of concrete. The estimated cost of the lock is \$250,000 in the first case, and \$550,000 in the second case. Both of these estimates are gratifyingly small, but they were made by careful and conservative engineers. There seems therefore to be no good reason why the difference of level between the Niagara River at Tonawanda and Lake Ontario should not be overcome by a series of locks of greater lift than 18 feet. If the lift was increased from 18 feet to 25 feet, the number of locks



could be reduced to 13; and if it was increased to 32 feet the number of locks could be reduced to 10. Of course a deep lock would cost more than one with a small lift. But between a great many shallow locks and a few deep ones there would be found a number which would give the most economical and advantageous result. I cannot tell now exactly what this number would be, but I am inclined to the opinion that 12 or 13 locks would be a proper number. This would probably reduce somewhat the estimate for lock construction. I am not prepared now to say how much this reduction would be.

The rock excavation is a pretty large item in the estimates for the construction of this canal, being nearly \$6,000,000 upon an estimated cost of \$1.25 per cubic yard. But one cannot help feeling that this estimate, particularly as it has ten per cent. added to it for contingencies in the grand total, is inordinately large. I see that rock excavation at the Cascade locks where the rock was very hard, and where labor costs much more than it does in this part of the country, was recently done in large quantities for about 90 cents per cubic yard. Upon this basis the estimated cost of 4,641,000 cubic yards of rock in the Niagara Ship Canal might be reduced \$1,625,000. On the Chicago Drainage Canal contracts have been let for the removal of rock at prices even less than 60 cents a yard. This would reduce the cost of rock excavation one half. Now to consider the form of cross-section of the canal. We find that the plan submitted (which by-the-way was simply for the purpose of estimate) called for a prism having a cross-section in rock whose area was 2050 square feet, and in earth 2652 square feet. In the first case the width at the bottom being 100 feet and at the water surface the same, this makes the side-walls vertical, which was proper. In the second case the bottom width was the same as in rock, and the surface width was 150 feet. This gives side-slopes of 4 on 5. In both cases, the depth was 20 1-2 feet. This follows the usual form of cross-section of canals. There are a number of reasons for it, but none of them apply with much force to the present case. In canals where the water supply is limited, it is necessary to adopt all means possible to prevent the loss of water. This loss is due to evaporation and to infiltration.

Evaporation is a function of the extent of surface exposed to the air. Therefore it is desirable to have such a canal as narrow at the surface as possible. The width at the bottom being

fixed by other considerations, this result can only be secured by making the side slopes as steep as they will stand. The loss by infiltration is a function of the wetted perimeter, that is to say, of the extent of surface in contact with the ground. As before, this surface can only be reduced by making the side slopes as steep as possible. In canals such as we are familiar with, the boats are towed from the bank; and in order to reduce the force necessary to move them to a minimum, it is necessary to have the tow-line as nearly as possible parallel to the direction of motion of boat. This condition requires the boat to move as close to the tow-path as possible; and this can only be secured by making the side slopes of the canal, on the tow-path side at least, approach the vertical. To secure these ends in canals the side slopes are generally made as steep as the earth will stand, and are protected by timber structures or dry stone walls, or perhaps it would be better to call them inclined stone pavements.

None of these considerations have much force in the case of the Niagara Ship Canal; for the water supply is inexhaustible, and the vessels would be moved by their own steam if they have it, if not, they would be towed by tugs. Therefore there seems to be no good reason why the side slopes should be made so steep that it is necessary to set aside the rather large sum of \$585,000, being nearly \$30 a running foot (which by the way would be none too much) to protect them from wash. Experience has shown in the Suez Canal that it is difficult for a large vessel to pass through without touching the sides, and they often bump along from one side to the other. As the slopes there are of earth they suffer no injury. I fancy the average vessel owner would not like to have his ship come bumping and grinding along against a stone wall, below the water line. Indeed I doubt if the wall would stand it, even if the vessel could.

I have already alluded to the Suez Canal,—the largest successful ship canal in the world, and it might not be unprofitable to draw some comparisons between it and the proposed Niagara Canal. The Suez Canal as you know connects bodies of water of about the same level, so that no locks are required. In this respect it is so radically different from our canal that it might seem that there could be no similarity between them. But the Suez Canal is an artificial ditch through which ocean-going vessels pass, and in this respect they are identical. This canal is 99

miles long including the Bitter Lakes, and varies in width at the water surface from 196 to 328 feet, according to the strata through which it is excavated. The bottom width is everywhere 72 feet. Its depth is 26 feet. At first sight this would seem very narrow for so important an avenue of commerce. But in point of fact, experience seems to show that this narrowness is a positive advantage.

Col. Stokes, one of the three directors of the company, says in a report: "It has been urged as a reproach against the company that it did not excavate a channel of the full width originally intended, namely, 200 feet at the surface and 144 feet at the bottom; but I think it is a fortunate circumstance that the intention was not carried out. I believe that the navigation is in consequence effected in much greater security, that the risk of collision is greatly reduced, and that in the long run the passage of the canal is performed in a much shorter average time than if vessels were allowed to navigate without supervision in a channel of the width originally proposed." "From causes affecting a vessel's steering, it does not unfrequently happen that she takes ground, but as the channel is narrow, when she swings across it in grounding she is inclined to the direction of the canal at a very small angle, and it is therefore easy to haul her off and get her straight."

A correspondent of the London *Times* puts this same idea in rather more forcible language. He says: "At first sight it might appear advisable that the canal should be widened, but I am convinced it would be a misfortune, as the wild vessels that now canon harmlessly from bank to bank of the ditch, which is only 72 feet across, would then instead of a canoning, dig their stems in it, and stick perhaps for hours." The rate of speed allowed in the canal is about 7 miles an hour. This varies somewhat with the size and draft of the vessel; all vessels are measured and a rate for them is fixed. It takes more power to drive a vessel at a given rate of speed in the canal than it would in open water.

The water is piled up in front of the vessel, the difference in level between the bow and stern being sometimes several inches. Vessels pass each other in the canal by means of "gares" or sidings. These are places where the width of the canal is increased to about three times its normal width. They are at frequent intervals throughout its length. To pass: One vessel enters the gare and is strongly fastened to the bank,—a bow-line,

a stern-line and two breast-lines being used. The vessel having the right of way keeps on its course, all of this is managed by by telegraph. It is found that the banks are not much injured by wash. If this theory is sound, then it might be possible to save one-fourth of the excavation proposed in the Niagara Canal by reducing the bottom width from 100 feet to 75 feet. The surface width I think should be greatly increased when the cut is in earth. Instead of 150 feet I would make it three or four hundred feet, and I would make the side-slopes from the water's edge down to a depth of six or seven feet very flat, and from this depth down to the bottom of the canal I would make the slopes as steep as the earth would safely stand—say about two on three. The upper flat slopes would be protected by a rip-rap of stone. The lower slopes would be left of earth, so that a vessel would not be injured if it happened to strike them. This form of canal would give the waves raised by a vessel a chance to spread and break on the flat slopes as on a beach, would afford space for the water to flow round the vessel, and ought to reduce the resistance due to passing through a narrow channel to a minimum. It would also greatly increase the reservoir capacity of the canal. So that in short levels, where the amount of water required for a lockage is often sufficient to materially lower the water surface, we should get two or three times as much water for a surface reduction of one foot as in the form originally proposed. In order to make a comparison between the two canals, I have had a



drawing made that shows the average cross-sections of the Suez Canal. And we note that it is narrow at the bottom, that it has flat side-slopes rising to within a few feet of the water surface and then assuming a still flatter slope like the natural shore of a lake or pond. Upon this upper slope the waves can spread and expend their force without doing any harm.

Superposed upon this cross-section, I have shown in a heavy black line the proposed cross-sections of the Niagara canal. We see it resembles as near as may be the cross-section of a horse-trough or a kitchen sink. And we can see why it would be necessary to expend a half a million dollars to keep these slopes from washing away.

As to the masonry required in the canal. I should be in

favor of using very little cut stone. The Akron Cement Works, which are only 18 miles from Tonawanda ought to be able to furnish a sufficiently good article at a very moderate cost; and this would suggest the extensive use of concrete. Iron and steel could be employed where greater wear or greater strength required it.

In the construction of this canal the immense water-power due to the difference of level of the lakes, would no doubt be used to its fullest capacity to reduce the cost of the work. And the well known methods of transmitting power by electricity and compressed air would no doubt enable many novel devices to be applied to the excavation of rock and earth.

The present project calls for the excavation of about thirteen million cubic yards of earth. A large amount no doubt. If it were placed in a hemispherical mound it would have a base over eleven hundred feet in diameter and a height of five hundred and fifty-five feet, quite a good sized mountain. But there is power enough in the water going over the Niagara Falls, if it could be applied and made to work, to excavate this entire amount of earth from the canal and place it on the bank in a little less than seven minutes.

The Manchester Ship Canal has a bottom width of from 120 to 170 feet with steep side slopes, and, if current newspaper reports can be believed, vessels steer very badly in it, and frequently strike the banks and get aground. This would indicate that the narrow canal is the best. This canal is about  $35\frac{1}{2}$  miles long, and cost nearly \$80,000,000. The original estimate was about \$50,000,000. There were enormous expenses connected with the right-of-way and the terminal facilities. The increase in cost over the estimates is said to be due to the death of the first contractor, involving a failure of his contract, and the performance of much more costly work by the company, by the delay of two years, adding vastly to the interest account, and by the floods of 1889.

Certain it is that by a proper combination of bad luck and unfortunate management you can spend almost any amount on a ship canal.

If the amount of earth and rock excavation in the Niagara Canal was as great as at Manchester, it would require the estimated cost to be doubled.

In discussing, as I have, this report upon the Niagara Ship Canal, it has not been my wish or intention to find fault with it.

It was simply a preliminary examination and was a very able one. My desire was to show that if the estimates err at all it is on the side of safety.

So much for the Niagara Canal. And now after getting vessels down into Lake Ontario, it is necessary to provide a way for them to pass from it to tide water in the Hudson River, say at Albany. The best route for this purpose seems to be via the Oswego River to the mouth of the Oneida River, then up this river to Oneida Lake, thence across the lake and over the divide to the Mohawk River near Rome, thence down the Mohawk to the Hudson. We have not as good information as to the cost of a ship canal via this route as we had in the case of the Niagara Canal.

The present Erie Canal system affords a route along this line for vessels drawing something less than 7 feet. In 1874, Col. Wilson, Corps of Engineers, made a survey of this route and prepared estimates for a canal 120 feet wide at the bottom and 10 feet deep, having locks 185 feet long, 29 feet wide, and with 9 feet of water on the mitre-sills. The locks to have an average lift of about 9 feet. The estimated cost of such a canal was \$25,000,000. Of course this was not a ship canal at all. It was intended for the use of steam barges or canal boats capable of carrying 28,000 bushels of wheat. And it falls so far short of what we now desire that it is of very little value as a means of determining what a ship canal would cost. We can, however, form a rough estimate of the probable cost in this way: Taking the estimate for the Niagara Canal as a basis (and from what I have already said about it we shall be likely to err on the side of safety), we find that the total amount of lockage on the Mohawk Canal is 610 feet, being nearly double that on the Niagara Canal. On the latter the estimate for locks was \$10,000,000, therefore the locks from Lake Ontario to Albany should cost double the sum, or \$20,000,000. The distance (leaving out the length of Oneida Lake) is about seven times as great as the length of the Niagara Canal. The estimated cost of excavation on the Niagara Canal was \$10,000,000, therefore, other things being equal, the excavation on the Mohawk Canal ought to be seven times as great, or \$70,000,000. This would make the total cost about \$90,000,000. I am satisfied that this is too large, because with exception of a short distance between Oneida Lake and the Mohawk River this route really would not be a canal at all, but

would consist of three canalized rivers, namely the Oswego, the Oneida, and the Mohawk. And as the existing channels of these rivers would be utilized to the fullest extent, the amount of excavation would certainly thereby be greatly reduced. In this rough way, however, you can form some idea what the cost would be.

The principal objection which is always raised to this Mohawk Valley route is the want of a sufficient supply of water for the summit level. They have considerable trouble now in periods of protracted drought in obtaining sufficient water for the present Erie Canal with its seven-foot depth. And the opponents of this route ask, with apparent reason, "How are you going to obtain water for a canal of five times the capacity of the present one?"

The present water supply is drawn from the Black River, a tributary of the St. Lawrence, and from certain reservoirs in the Adirondack region. It is stated in many of the reports upon the subject that the present reservoirs are not utilized to the best advantage, and that many others might be built which would enormously increase the supply. But if this source should prove inadequate we have an inexhaustible supply in Lake Erie. The level of the water in Lake Erie is about 150 feet above the summit level of the canal at Rome, and there are no insurmountable obstacles in the way of conducting this water in any desired quantity to the Rome level by the construction of an open feeder similar to the large irrigating ditches now under construction or in use in some of the Western States. Such a feeder might leave the Niagara Ship Canal at Lockport, at which point the water would be very nearly at Lake Erie level; it could then either be carried by a route entirely separate and distinct from that followed by the Erie Canal to the Rome level, or else a portion of the present Erie Canal might be utilized. The water from Lake Erie is now carried in the Erie Canal as far as Montezuma, the point where the canal crosses the Seneca River. This point is below the Rome level, and of course the water cannot now be utilized beyond it. If the Erie Canal was used at all it would be necessary to depart from it in the vicinity of Rochester, and maintain a higher grade in order to carry the water over the present low portion.

A different crossing over the Montezuma marshes would undoubtedly have to be selected, and the water carried across this



low ground either by means of a viaduct similar to those used in the West, or possibly by an inverted syphon.

It might be asked, if all this work is to be done in order to bring water from Lake Erie, why would it not be better to make this feeder a little larger and use it as a ship canal? The answer would be, that in the case of a feeder, which is not to be navigated, we should be able to resort to tunnels, inverted syphons, and other similar devices when necessary to carry the water over and through obstructions, and we should not be restricted in the matter of alignment as in a navigable canal.

For these reasons a feeder, which would be ample for the purpose, could no doubt be constructed for a very small fraction of the cost of a navigable canal.

Finally, the great advantage which this route—that is to say, the route by the Niagara Ship Canal, Lake Ontario and the Oswego, Oneida Lake and Mohawk River, offers over any other route which can be selected, is this, that it does not cross any natural water course, and that it gives the maximum of open lake and river navigation and the minimum of navigation in canals.

From Albany to the sea, the route would be by the Hudson River. Some work would have to be done upon the upper portion of the river to secure a low-water depth sufficient for vessels drawing twenty feet.

Congress has provided the means for extending the 12-foot depth to the State dam at Troy, and the work is now in progress. A Board of Engineers appointed for the purpose reported that it would cost about \$20,000,000 to make this depth 22 feet. Their estimates are certainly abundantly large, and I think the work can be done for very much less.

This would make the whole work to be done, which is not now provided for, cost one hundred and thirty million dollars. An enormous sum, but the country is able to pay it, and it would prove to be the very best investment it ever made.

I cannot dismiss the subject without saying something about the other possible routes from Lake Ontario to the sea. One suggested route is down the St. Lawrence to Ogdensburg, or perhaps to some point below, and then across the northern end of the State of New York to Lake Champlain, thence by an enlarged Champlain Canal to the Hudson at Albany. The route across the northern part of the State has never been surveyed, and it is not known that it would be possible to carry a canal through there.

It is doubtful if an adequate water supply could be obtained for it. It is very much longer than the Mohawk route. It is so near the frontier that it would be very difficult to defend in time of war, and finally it is so much further north that the season of navigation would be at least a month or six weeks shorter.

Another route is down the St. Lawrence to the outlet of Lake Champlain, thence through the river and lake to the Hudson. This route is open to all the objections above given, except perhaps the lack of a water supply. It also presents the absurdity of a route which, after once reaching tide-water at Montreal, where it has a free and unobstructed course to the ocean, turns back and traverses more than 300 miles of river, lake and canal in order to reach another sea-port that is a good deal further from Europe than the one it just left. Moreover it lies in foreign country, we can't go over there and dig canals.

I know it has been stated that the arbitrary boundaries of nations cannot arrest the natural course of commerce. But they do. Finally there is the route by the way of the St. Lawrence which the Canadian Government is now deepening to fourteen feet. It has been suggested that we might join with them, and together improve this to a 20-foot route. We should then be simply a joint owner. We could not expect to use it to our exclusive advantage, and our future rival in the grain trade would beat us with our own weapon. And in time of war, if war ever comes, we should find ourselves compelled to fight the duel with a single sword and our antagonist would have his grasp on the hilt.

## THE PLACE OF PHYSICAL TRAINING IN THE MILITARY SERVICE.\*

BY CAPTAIN JAMES E. PILCHER, ASSISTANT SURGEON U. S. ARMY.

**I**T is an admitted fact that the mortality from disease attains a considerably higher percentage in war than that from wounds.

It would seem then that the prevention of disease is the most important function of the medical officer in active campaign. In peace, where the mortality of the battle-field is entirely eliminated from consideration, prophylaxis plays a still more important rôle. Recognition of the value of careful attention to the suggestions of the medical officer as an important factor in securing the greatest efficiency of a command, has been a matter of slow growth, but it has been progressive. The influence upon a command of the sanitary condition of camps, cuisine and clothing has come to be fully recognized through the active labors of army medical officers until the surgeon is no longer considered a useless encumbrance except when sickness is present, but takes his place as the most important member of the staff.

It is singular that while the medical department has devoted ample attention to the prevention of disease by the removal of threatening conditions, it has almost entirely neglected prophylaxis by increasing the resisting power of the soldier himself. It is true that the line has been equally unmindful of so potential an agent in securing efficiency in the soldier, devoting centuries to the development of the weapons of war, entirely regardless of the development of the men who were to handle them. Later, however, a new interest has arisen in the subject, and at some military posts useful work has been done with insufficient appliances. The sentiment of those officers who have given physical training a fair trial is unanimous in favor of its vast utility. Medical officers, however, have given it but little attention, although they alone are qualified to fully understand its value or to supervise its conduct.

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The culture of the body, to be correctly accomplished, demands not only sufficient anatomical and physiological knowledge to locate defective parts, but sufficient pathological perceptivity to appreciate the advantages or dangers to be incurred by training these parts. That it is impossible for any but a medical man to comprehend the needs of the body in the matter of training has been recognized by the better class of instructors in physical culture from Ling, the founder of the Swedish system, down to the great teachers of the present day, who have almost invariably qualified as physicians as an essential preliminary to the proper comprehension and application of physical culture.

While physical training may with propriety be called muscle building, it should be understood that the culture of every other constituent of the organism progresses *pari passu* with that of the muscles, to which the chief attention is given. It requires the most accurate notions of the muscular structure to select the individual muscle to which a part owes its weakness or lack of symmetry. The anatomical and physiological knowledge necessary to individualize and educate distinct muscles in such a manner as to produce symmetry and correctness of contour and the maximum of strength combined with the greatest facility in its employment, demands special medical training. Any one can run a tape measure about an arm, but it requires not only the information acquired in the dissecting room and the physiological laboratory, but the power of discrimination developed by careful and intelligent clinical observation, in order to discover what particular member of a group of muscles is responsible for the lack of power which it is desired to correct. Not only does it require the most correct appreciation of muscular function to understand the particular movement or combination of movements adapted to the development of a defective muscle, but, in order to secure the best results, there must be a familiarity with the secondary and remote effects upon other portions of the system.

The perfect man is a figment of the imagination. No person is known to have existed who was an embodiment of perfect health. A physical examination of the most vigorous would reveal in each some lesion of actual disease, some predisposing weakness, or both. The object of physical training is to take cognizance of physical deficiencies and correct them by movements adapted to secure growth. Hard labor is far from being

an equivalent of physical training. It is true that laboring men acquire great strength in certain groups of muscles, but this gain is overbalanced by losses in others. The plowman has strength in his arms, back and legs, but he loses in his respiratory muscles and the anterior thoracic muscles. The deformities of occupation, due to the excessive use of one portion of the body, to the neglect of others, have a recognized place in orthopaedics.

The material obtained by taking the average man is excellently shown in Prince Hohenlohe's description of the men obtained in the recruitment of his own regiment. "The barracks were soon full of figures that would put to shame the most exaggerated cartoons of the comic papers. The awkward fellows, whose neglected carriage made them look like a set of botched-up images, tried hard, but in vain, to stand erect. Ill-made and undeveloped, their uniforms would not fit them and, if altered to fit their present figure, would need to be re-made when they should have been remodelled by physical training. So, before teaching them a single movement of the military drill or providing them with uniforms other than their canvas fatigue suits, they were drilled in gymnastic exercises leading progressively and gently from the more easy to the more advanced, until finally they had a reasonable command of themselves."

This picture reminds one somewhat of the appearance of the "candidates" at West Point. These young men have quite generally been subjected, before coming to the Academy, to a physical examination by a competent medical man and by him pronounced physically sound. But they are almost to a man awkward, unsymmetrical and unevenly developed, making an appearance, as they are marched to the mess hall, fully as absurd as the conscripts of Prince Hohenlohe. And they form a particularly instructive contrast with the third class men, who have enjoyed the advantages of a year's drill in physical training.

Methods of recruiting employed by the regular army in times of peace, to a large extent prevent the admission into the military service of men with muscles clearly undeveloped or atrophied by distinctly marked disease. Still it is not infrequent in my observation that men are enlisted, particularly by the regimental recruiting service, with defects or deficiencies sufficiently pronounced to contribute to their life for the next two or three years an important bearing upon their future health. While

actual deformity or disease is a bar to the admission of the recruit, the variation in structure is so great that but a small proportion of recruits are either symmetrical or developed.

In the National Guard, where for evident reasons the physical requirements need not be as severe as in the regular service, the field for physical training is still broader and the results obtainable still more striking. Voluntary service lends to the work of the guardsman an enthusiasm which is an important factor in the attainment of the best results.

Physical training may be divided into two categories:

1. Preparatory training, by which deficiencies are corrected and a proper equilibrium of the system secured.
2. Conservative training, by which a well-balanced state of the system is maintained after having once been obtained.

The preparatory training particularly demands medical supervision. Here the methods of physical diagnosis come into play. Mensuration, inspection and palpation are of particular importance. In many gymnasiums, mensuration is the only diagnostic method employed, but it is evident that it is necessarily insufficient since one group of muscles may be so over-developed as to neutralize, in the measurement of a limb, the effect of the atrophy of another—the girth of a part may be up to the average and yet a very definite defect may be readily detected by experienced inspection and its character appreciated by careful palpation.

As a general rule, weight, height and breadth may be said to be in direct proportion to the strength. But the exceptions to this rule are numerous and pronounced. Weight may be due to an excess of adipose tissue, tending to produce debility rather than strength. Height may be due to excessive length of legs or neck, both elements of weakness. Breadth may exist with flaccid muscles and fatty deposits, which are incompatible with great physical power. As already suggested, there is usually a lack of harmony in development between the various parts of the body, and in this disproportion may lie the source of marked physical deficiency. The well developed chest and arms are more than likely to be accompanied by spindling legs. The limbs of the left side are, in a large proportion of cases, smaller than those of the right—an asymmetry which extends to numerous other details.

The preliminary facts upon which to base the preparatory training, are of ten varieties: (1) the *weight*; (2) the *height* from the floor of the knees, the pubic arch, the sternum and the vertex

of the head, the latter with the body standing and sitting; (3) the *girth* of the head, neck, chest, waist, hips, thighs, knees, calves, insteps, arms, forearms and wrists; (4) the *depth* of the chest and abdomen; (5) the *breadth* of the head, neck, shoulders, waist and hips; (6) the *length* of each side from shoulder to elbow, elbow to tip of middle finger, of the feet and of the body laid horizontally; (7) the *stretch* of the arms; (8) the *capacity* of the lungs; (9) the *strength* of the lungs, back, chest, arms and forearms, and (10) the *development* of the body. The appliances necessary for obtaining these data are a steel tape-measure, a large pair of callipers, several spring dynamometers, a spirometer, a mamometer, a pair of suspended rings and a set of parallel bars.

We are fortunate in having at our disposal at the present day the data based upon a large number of observations already made, by the consolidation of which types of manhood have been obtained. Sargent's observations are perhaps the best known and the most extensive, but in the records of the scientific gymnasiums of the country a vast amount of information can be obtained, particularly pertaining to the dimensions of youth and early adult age.

These data are exactly what is required by the surgeon in the examination preliminary to the preparatory training, for recruits are—invariably in time of peace—young men. Accurate examination of the recruit, using the eye, the hand and the accessory instruments already enumerated, will show his deviation from the normal type, from which the exercises necessary to assimilate him to the normal will be a natural deduction. Muscular development depends on frequency of muscular action. The man with undeveloped calves would be given foot and ankle exercises, and he with a slender forearm would engage in the wrist and finger movements. The flattened chest would be brought out not only by use of the accessory respiratory muscles, but all exercises would, by causing deep and frequent breathing, cultivate the respiratory apparatus. The muscles of the neck and face can each be brought up by individual and combined movements. In connection with the special exercises prescribed for the compensation of deficiencies, the recruit will naturally engage with his comrades in other movements which will at the same time keep up the general physical tone until he shall have attained a sufficiently uniform development to permit his passing into the class of the soldier and engaging only in conservative training.



The time during which the recruit remains in the preparatory class is very variable, being dependent upon two factors: (1) the amount of deviation from the normal type, and (2) the readiness with which he responds to treatment. During this period he should be continually under medical supervision, but when he passes into the second class, the personal medical inspection need be far less minute, although it should never be entirely withdrawn, as long as the training is continued.

The soldier now enters upon the conservative training, extending to the general field of gymnastics where the exercises are numerous and varied. Every movement of the manual of arms and every evolution in marching have an effect upon the muscular system. But it is an error to presume that these are sufficient for thoroughly maintaining bodily efficiency. Not only are they by themselves insufficient for the maintenance of symmetrical development, but they even tend to the accentuation of asymmetry. The very existence of the "setting-up" drill is an evidence of this fact. But while the expanded "setting-up" drill as now practised, serves excellently to correct the vicious attitudes imposed by certain phases of military duty, it is not competent, unaided, to maintain a high physical tone. Even were the prescribed military drills efficient in maintaining a symmetrical physique, they would soon, by constant repetition, become merely mechanical in their execution, a fact which would detract vastly from their usefulness. Physical training, in order to retain the interest of its participants, should be the subject of unlimited variation. There are no movements like those of the manual of arms requiring incessant repetition to secure precision in execution. Infinite diversity then may be obtained by the employment of the almost boundless category of muscular action—running, leaping, climbing, swinging, turning, lifting, striking and the like, in various attitudes and with various surroundings, without apparatus and with the great variety of apparatus contributed by modern inventive genius. Athletic sports are also a powerful factor in stimulating interest in physical training and for that reason should be heartily encouraged. The spirit of competition thus introduced into the work is of very considerable advantage, although a tendency, apparent at the present time, to subordinate physical training entirely to a preparation for participation in sporting contests is to be deprecated.

An objection urged against physical training in the army is

that the men do not take interest in it. This would hardly be supposed to be a valid objection to any plan looking to the improvement of the service. And, moreover, it is not a valid objection. If there is absence of interest anywhere it is due to some defect in the management of the training. To put up a horizontal bar and a dozen dumb-bells and magnificently remark to a garrison: "There is your gymnasium. Use it," is discouraging enough to ruin any project. The untrained man does not know how to use gymnastic apparatus. He may have seen the "Queen of the Air" swinging on a trapeze, but he quickly finds that circus acts are not physical training, and he naturally loses interest in the subject. He would lose interest in just the same way in the choicest book of Arabic that might be put before him. He must be taught how to utilize his opportunities. It is like any game—it must be understood to be enjoyed. And here is where the work of the medical officer comes into play and the instructors in physical training find their functions.

But he will require no instruction to appreciate the benefit of the training. The muscular growth begins at once; the size of the body increases; the circumference of the limbs is greater; the chest is enlarged and the weight is augmented. The influence upon the system of the enlargement of the chest alone cannot be computed; the greater expansion permitted to the lungs, the greater play allowed to the heart, the greater amount of oxygen introduced into the system, the greater excretion of effete matter from the blood, with their secondary effect upon every cell and organism in the body, cannot be expressed. The increased girth of the extremities is not the only indication of their added strength, for it does not take into account the firmness and contractile power gained even before the growth began. The quickened sympathy between the brain and the muscles cannot be shown by any test. The suppleness, the agility, the self-confidence that have developed, cannot be represented by figures. The added keenness of perception, the comfort and satisfaction contributed to existence itself cannot be estimated, much less represented.

Physical training then should occupy a two-fold place in the military service:

I. In its preparatory phase, it should be at the basis of all service (a) to build up to symmetry men whose physique is below the standard; (b) to improve the muscular harmony of all re-

cruits, none of whom are symmetrical at enlistment; (c) to give to the men that ready command over the muscular system that only comes from thorough training, and (d) to contribute that quickness of mental comprehension only to be derived from exercising in response to frequently varied commands.

II. In its conservative phase, it should still remain at the foundation of all service. It is not enough to bring a soldier up to the maximum of physical serviceability, but he must be kept there. To overcome the retrograde tendency characteristic of all forms of life when stimulated to a higher grade, and no less present in physical development, a certain degree of training must be maintained constantly.

III. In both places it should receive (a) the active personal support of the medical officer, for by strengthening the weaker portions of the system it will increase the resistance to disease and vastly diminish the sick rate of his command; and (b) his most careful supervision as well, in order to insure the proper direction of the training and prevent excess in its application, an error in either case being sufficient to preclude a healthful growth.

The results of the scientific application of physical training to the military service will be wide reaching in their beneficial effect.

1. The serviceability of the recruit will be more quickly obtained, not only by insuring the symmetrical growth of his frame, but by the awakening of his muscular activity and the consequent quickening of his mental faculties.

2. The efficiency of the entire army will be increased by the development of the physique of the units composing it.

3. The morality of the army will be elevated by substituting the healthful sports connected with physical culture for the less reputable amusements in which soldiers are sometimes tempted to indulge.

4. The economical administration of the Government will be materially assisted, for training the soldier to physical vigor will result in keeping from the pension rolls names of many who would otherwise promptly degenerate into helpless dependents upon the bounty of the State.

5. Not only will it vastly increase the efficiency of the military service, but it will have an extensive influence upon the entire community. As the years roll by, it will present to the

commonwealth, upon their discharge from the army, a class of men, by their physical development and mental capacity, qualified to be more than ordinarily useful citizens. By its extension to the military schools, springing up all over the country, it will encourage healthful tendencies and manly inclinations in our youth. Through its adoption by the National Guard—always quick to adopt the best features of the Regular Service—it will disseminate physical development and intellectual activity throughout the young men of the nation. In every class of society, in every grade of life, wherever health is understood and length of life desired, its influence may be felt and its effects may be appreciated.

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#### THE ROYAL ARTILLERY COLLEGE AT WOOLWICH.

Written for the JOURNAL OF THE MILITARY SERVICE INSTITUTION.

ENGLAND'S artillery school is located in a substantial stone and brick building not quite so large as the West Point cadet barracks. It stands upon a bluff directly overlooking the royal dockyard, the vast army and naval arsenal and the Thames River, and forms with its many turrets one of the most prominent structures of suburban Woolwich. Behind it upon the same plateau, are the military repository, the military academy, and the military service institution, the Royal Artillery buildings and hospital, scattered irregularly through the town.

The college building contains among its rooms, which are spacious and well-lighted, the headquarters and the various administrative offices of the college, many lecture, recitation and model rooms, the chemistry and electrical laboratories, telegraph and telephone practice rooms, library, position-finder tower and various halls where students meet daily and where they may find and examine most of the modern artillery appliance, domestic and foreign, described in their text-books. There are also at the dockyard and the arsenal, a few rods distant, offices and lecture rooms assigned to the college for instruction in carriages, munition, etc., a workshop for taking gutta-percha impressions, adjusting sights and gun-fittings, and, in addition, carpenter and smith shops for instructing wheelers, smiths and machinery gunners. All officers and men on duty at the school are quartered at various places in Woolwich.

The college was originally established to enable artillery officers and men to acquire technical knowledge of artillery in all of its branches, other than drill. The location does not admit of gun practice which is gained elsewhere, as at Shoeburyness. Gradually, however, the scope of the college has been extended. Certain officers of the navy and of the colonial governments now avail themselves of its resources in certain branches of special instruction, and all arms send artificers for training. Officers of any branch may on application receive instruction in any of the scientific departments and may use the laboratories if such use will not interfere with the regular work.

*The institution is under control of the Director-General of Military Education in London.* Its immediate head is a colonel of artillery known as the Director. There are fifteen instructors, of whom six are civilians distinguished in their respective branches, like Greenhill in mathematics, Hodgkinson in chemistry, Browne in ordnance and armor, and Jones in steam and mechanism. An assistant in electricity is a young graduate from Prof. Ayrton's laboratory. All others are officers—two lieutenant-colonels, four majors and three captains, selected from the best known of the Royal Artillery. Their positions are held for unequal periods; one was assigned in 1874, one in '80, one in '86, and so on. All instructors take the officers classes themselves and superintend—each in his branch—the instruction of non-commissioned officers and men, who are directly instructed by an assistant.

Every year the artillery college receives approximately one hundred and twenty-five officers, usually below the rank of major, who remain for periods varying from one month to two years, according to the course pursued. There are also under instruction during the year approximately four hundred non-commissioned officers and men distributed in nine classes, or courses, which continue for periods varying from one to eighteen months, to be trained as master gunners, position finders, siege train specialists, armament artificers, laboratory assistants, navy armorers, engine drivers, telegraphers, telephonists, and also military artificers of whom there are about two hundred and fifty under instruction at one time. A certain number of qualified men who have completed their course are retained at the college for employment and further instruction.

Thirteen different courses have been arranged for officers, of

which some one is pursued as the War Department may determine and in certain cases as the officer may apply, to wit :

The first, or "Senior," class selected by competition from all branches of the service, but composed by regulation largely of artillerists, has sixteen members who pursue a two years' course. Its studies are of an advanced order and will be noticed later.

The second, or Firemasters, class has ten artillery officers, remains eight months in the manufacturing departments, takes an elementary course in electricity and chemistry, and after graduation its officers are eligible for appointments as inspectors of war-like stores in the inspection branch, and for colonial employment.

The third, or Special, class of ten artillery officers remains three months to learn the elementary principles of electricity, steam, hydraulics and ordnance mechanism, and on completion a report is made of each student.

The Position-finding class of ten members, of any rank or branch of the service, devotes three months to gain a working knowledge of position finders and cable tests. After passing the final rigid examination, its members are eligible to "P. F." appointments in their regiments.

The fifth, or Long, course has approximately twenty artillery officers for ten months, who apply to take a course in steam, mechanism, electricity, guns, etc., and to attend practice at Shoeburyness.

The sixth, or Junior, class includes all officers commissioned to the artillery from the militia, colleges or colonial forces. Four months are given to artillery, military topography, field fortification and minor tactics.

Seventh class: All officers on first appointment as ordnance inspectors receive instruction in guns, ordnance material, engines, dynamos, etc., and then go to Shoeburyness.

The eighth class is formed of volunteers from the Woolwich garrison who take a course in field artillery.

The ninth class has twelve navy lieutenants who for about a month go down daily from Greenwich for instruction in naval ordnance. The tenth class of six naval torpedo lieutenants is also detailed by the admiralty for a brief course in the manufacture of powder, cordite and other explosives and in packing torpedoes.

The eleventh class receives all officers on first appointment to the Ordnance Store Department for instruction in the care and preservation of stores, making out papers, etc.

The twelfth, or Promotion, class is held two months each year to assist about thirty officers at Woolwich in their preparations for examination.

The thirteenth class for individual instruction has officers from every branch who voluntarily take a course in field sketching, demolition, repairs, etc.

It will be seen that the Woolwich courses are intended chiefly for specialists. Even that taken by the Senior class, which is the most comprehensive and thorough of all, is confined to actual artillery. No attention is paid to the technical work of coördinate branches.

As a rule, the English artillery officer whose aspirations lead solely in the direction of garrison duties is not detailed to the school. If, however, he wishes to make himself eligible for some assignment open to the Royal Artillery or, after appointment, to prepare himself for his new duties, he enters either the artillery or the staff college where he is taught only the latest and most approved means and methods. His work here is chiefly of a practical nature, of the slow-but-sure kind as exemplified in most military drills and in those civil technical schools which turn out mechanical engineers and other experts. What theory is taught at Woolwich finds its immediate and direct application to the duties, necessarily limited as in all other professions, of the artillery service with which the college is in close relations. If its graduates later attain prominence in the world's gunnery, literature and practice, it is a natural sequence to the method of their selection and the thoroughness of their training. Any one who will visit the powder factory at Waltham Abbey, the small-arms manufactory at Enfield, the school of practice and the proving grounds at Shoeburyness, or who inside the business-like arsenal at Woolwich, will inquire into the system which directs and turns to account the labor of 12,000 men scattered over 350 acres of ground, may learn and appreciate what England owes to one of her principal war schools. A majority of the officials acting as superintendents, inspectors and their assistants at these places belong to the artillery.

Some idea of the school equipment may be gained by noticing those of two or three of the departments. The chemistry outfit in four rooms is perhaps the most complete and contains all that is necessary to enable a large class to gain a working knowledge of chemical philosophy, to make various analyses and metallurgi-



cal processes, to manufacture powder, gun-cotton and cordite in small quantities and to test their condition. The electrical laboratory in two large rooms has thirteen testing tables fully equipped for electrical measurements besides a lecture and general working tables. Such apparatus as has been adopted in the service for telegraphing, telephoning, firing of guns, mines, etc., may be seen in adjacent cases, together with many valuable instruments used in standardizing and in demonstration. The mechanical department possesses a great variety of models, diagrams and such mechanism as arms, joints, pulleys and devices for the conversion, transmission and variation of power, just as in the rooms devoted to gunnery, or artillery proper, one may find all articles described in the text, or models or diagrams thereof, (and sometimes the three) which serve to aid the lecturer in making clear the details of construction, or the uses and the limitations of what appears best in modern artillery machinery and armor.

Frequent visits are made by the classes to the royal arsenal, dockyard, to Enfield, Weedon and also to certain private establishments in England and Wales. Indeed, the main object of the Woolwich plan seems to be to make the students acquainted with artillery implements and methods in as direct and intimate a manner as possible, and the text-book which is followed in all branches as little burdensome. Lessons are regularly assigned and diligently studied. Officers attend the class-room for three hours at a time; their daily total of hours of work is not less than seven and rarely exceeds ten. In nearly all departments instruction is imparted by lecture, demonstration, discussion and quizzing. Mere recitations of the text are not permitted. The instructor estimates the progress of each student from his work and by questioning. Marks are given daily and honors are freely bestowed. The maximum marks allowed in the various subjects pursued by the senior class, indicate the relative importance attached to them viz: mathematics, 2000; chemistry, 1500; metallurgy, 700; ordnance and gunnery, 1800; electricity and optics, 1200; steam and mechanism, 900.

The course of the senior class approximates more closely than any of the others to that of the Fort Monroe school in the character of its studies, the period of work and in the number and the state of preparation of its students. This class is open to all arms of the service excepting the engineers and is limited to sixteen members selected by competition throughout the British

services. Six are chosen from the Royal Artillery, six from all other arms, two from the navy or marine corps and two from officers highest on the qualified list irrespective of their branch. Examination of candidates is conducted by boards of three field-officers each. For the United Kingdom a board is annually assembled at Woolwich; abroad, general officers convene boards at certain stations. Explicit instructions are issued for the guidance of boards and the information of candidates. The subjects of the examination for entrance and their maximum marks are: chemistry, 600; physics (heat, light, sound and electricity), 400; mathematics and pure mechanics, 800. To qualify, a candidate must get 400 in mathematics and 1000 in the aggregate.

The successful officers report at Woolwich on the 31st of March and are attached to the Royal Artillery district staff for quarters. The two years' course embraces higher mathematics with its applications to gunnery and gun construction, chemistry and explosives, physics, steam, mechanism and electricity. The class also visits Wales to witness metallurgical operations, the Palliser shot foundry and at various times, Chatham, Dover, Portsmouth and Spithead to inspect armored ships and forts. Each subject terminates with a written examination superintended by officers specially appointed and not by the instructor. Any student officer who through deficiency or neglect or failure to qualify at any examination is recommended by the director for removal is promptly relieved. With the completion of the two years' course the director of the college makes a final confidential report to the Director General of Military Education placing the names of officers in the order in which he believes their claims to employment may be fairly considered and indicating the special branch for which he believes each best fitted. Graduates have "p. a. c." after their names in the army register and are eligible for assignment in any of the manufacturing departments, in the office of the Director of Artillery, in the inspection branch of the British service; in the Artillery College and Royal Military Academy and, if they belong to the Royal Artillery, as firemasters and in the Indian ordnance department.

The interdependence existing between the navy, the artillery and the gun manufactory of England has greatly contributed to the efficiency and economy of each. British construction arsenals, naval and military, have been, practically, brought to one place where business principles prevail and where the artillerists not

only try and select the weapons they must use but also watch the processes of their construction. A similar course is followed in the American navy. The choosing and testing of weapons is a delicate task and to prepare officers for it is one of the objects of the Artillery College. Some of the class rooms are inside the arsenal gates.

The institution is fortunate enough in the matter of its equipment and immediate surroundings, but what will specially impress the visitor are the bright prospects it is enabled to hold out to its graduates, the practical character of its course and the enthusiasm shown by instructors and students. These have a single purpose—a narrow one it may be—in the promotion of their special art, but some of the results are that the Royal Artillery occupies an exclusive position in the British service, its literature is the most extensive of its kind in the world and its practices are imitated.

#### THE INFANTRY DRILL REGULATIONS SYSTEMATIZED AND SIMPLIFIED.

BY FIRST-LIEUT. CHARLES R. NOYES, ADJUTANT 9TH U. S. INFANTRY.

AS the drill regulations stand to-day there is a lack of system and thence a want of simplicity in the movements and the commands. System and simplicity have been sacrificed to the desire to get from one formation to another by the shortest possible route. It is, of course, true that by taking the shortest route, time is saved, and time is an important element to consider, but how much saving is there when the whole distance to be passed over is only a few hundred feet? Very little. It would be better to save time by making the movement in double time, if by giving a little longer distance simplification was attained. Simplification can only be attained by the application of general principles, and our first efforts towards simplification must be addressed to the discovery of such principles if there are any. Let us look at the battalion drill for a few minutes. The major has his battalion in line. If he wants to go to another part of the field his simplest way is to put the battalion in column of fours and march there in that formation. This suggests that the column of fours is the normal formation from which to form up into any other. Adopt that as a principle. Always pass into

the column of fours and from that to the new formation. I do not mean by this that it is necessary to string out the battalion to its full length in column of fours. It merely passes through that formation and the head of column may begin forming up in the new formation at once. Now to get at another principle. The head of column of fours having arrived on the ground where the formation is to take place, the new formation can be on the ground which lies to the right or to the left of the prolongation of the line of march. Thus, suppose the column of fours has come up and halted, it can form line facing to the front either by extending toward the right or toward the left. It can form close column on the right side or the left side. Furthermore, the new formation can be faced forward, to the rear, to the right, or left.

There are then three things the companies want to know at the moment of beginning the formation, and these the major should announce in his command. They are,

1st. The particular formation.

2d. The direction in which he wants the formation faced.

3d. The ground, whether the right or left of the head of column on which the formation is to stand.

The major's command should always indicate these three things, and as they are all the companies want to know, it follows that under this principle his commands will be always of the same form and their only variety will be first, in the name of the formation as "line," "column of companies," "close column," etc; second, in the facing direction, as "right," "left," "front," "rear;" third in the ground, as "right," or "left."

Many of the commands in the present drill regulations conform to this principle, some do not. So far, then, we have two principles to be used in systematizing and simplifying:

First, the column of fours is the normal or base formation from which to proceed into another.

Second, the commands should indicate three things, the formation, the facing direction, and the ground. There is yet one other. It may be crudely stated in this way—the head of a column of fours having begun the new formation, the remainder of the body should be *drawn* into its place somewhat as a snake's body follows the head in all its sinuous course or as a chain is drawn along. The body should not break up into integral parts in going to the new formation. The most snakelike or chainlike

process of forming up from the column of fours is by the movement "on right or left into line." Let us use this as a third principle. It is hardly more than a corollary of the first.

With these three, see how some of the movements and commands of battalion drill work out. In general the part of the school of the battalion up to the successive formations conforms to our principles, and their application will be better illustrated in the parts further on. For instance the command in paragraph 289 would be,

1st. Form line, facing right, right ground.

2d. March.

In this command we have first, the formation, "line"; second, the facing direction, "right"; third, the ground on which the formation is to stand, "right." The explanation of the movement would be as it is now.

Par. 290. Commands. 1. Form line, facing front, right ground. 2. March. Explanation. At the first command the captain of the first company commands, 1. Column right and repeats the command march. Immediately after the first four has changed direction he commands, "1. On left into line." "2. March." The other companies follow in the trace of the first and execute on left into line in succession.

Par. 291. Commands. 1. Form line, facing rear, right ground. 2. March.

Explanation. Executed as explained above except that each company executes on right into line instead of on left into line.

Par. 294. Commands. 1. Fours left. 2. Rear companies form line, facing front, left ground. 3. March.

For extreme accuracy in this movement par. 293 might be changed to read "the command march is given as the rear four of a company is about to change direction."

Par. 295. Commands. 1. Fours right. 2. Rear companies, form line facing front, left ground. 3. March, and adds "rear companies about." Each rear company executes fours right about as soon as formed in line facing front.

Par. 298. Here is a place where our first principle is applied. Being in line to form column of companies, first form column of fours to the right. This is done for simplicity's sake. It takes a little time, but as I have said before, the time can be made up by executing the movements in double time. After all, the time lost is inappreciable. Some will say it is a faulty plan which

does not permit going from one formation directly to the new one. But I am of the opinion that for the sake of simplicity it is better to pass through the normal formation column of fours. It will do away with all the "turns" and the complexity which they introduce. From column of fours the command, according to our principles, would be, 1. Form column of companies facing front, left ground. 2. March. Explanation. Each captain would command "column left" and immediately "on right into line, march." Similarly, column of companies could be formed facing right, left or rear, and on right or left ground.

Par. 304. Could be executed by "right forward, fours right" and "fours left" but it would be better to abandon such movements altogether. The intention is to march the command to the left, which can be done in column of fours just as well.

Par. 308. An application of the principles could be made, so as to do away with the turn.

Pars. 312 and 313. Form column of fours before executing the movements, doing away with new commands and complex movements.

Par. 315. Form column of fours to the right.

Par. 323. Form column of fours, then column of companies, facing right, left ground.

In all these cases there is simplification because as soon as the column of fours is formed the movement reverts to one already explained.

Par. 325. Commands. 1. Form line of companies in columns of fours, facing front, right ground. 2. March.

Explanation. Same as now given except that the leading company halts at once, or say at five paces, just room enough to allow the second company to turn out of the column, second company executes column right, and when opposite its place, column left. Each of the other companies follows in the trace of the preceding one until it has changed direction into its proper place then proceeds to its own proper place thereby maintaining the chain idea of following the head. Keep the links united as long as possible.

Now for the close column. In going from one formation to the next, pass first into the column of fours. If the formation from which the battalion is starting is close column, the companies must form column of fours successively, the head of column begins the new formation at once without waiting to string out the battalion.

Take par. 339 first, because there the close column is formed

from column of fours. Commands. 1. Form close column, facing front, right ground. 2. March. Observe that the major's command is exactly the same as in forming *line* to the front and right with the exception of the kind of formation required. By adhering to the principle that the three things the company commanders want to know are the the formation, the facing direction and the ground, the major's commands become very simple. In fact, as stated before they are essentially the same all the way through and the principle of coming into every new formation from column of fours in a chainlike way simplifies the execution.

Explanation now of par. 339. The captain of the first company commands column right. 2. March, and immediately after, on left into line. 2. March. Each of the other companies move forward and execute column right so as to enter the column on its proper ground and executes on left into line. If the command had been "Form close column, facing *right*," the first company would have executed on right into line at once. The other companies would have followed their leaders, the second company changing direction to the left, and, when opposite its place, going column right and on right into line; the others, to their places similarly.

Now to return to par. 335. We see that after forming column of fours the explanation given above covers this case, by which I mean that the formation of close column is made on practically the same ground and facing in the same direction as now given in the drill regulations and this movement as a distinct and separate one is eliminated. Same with par. 338 and others.

Par. 344. Commands. 1. Form close column, facing left, right ground. 2. March.

Explanation. The first company executes right forward fours right and immediately after, on left into line. The other companies execute right forward fours right, in succession, the second changing direction column right and when opposite its place, column left and on left into line. The other companies follow and come into their places in the same manner as described for the second. This would reverse the right and left of companies, a matter in most circumstances, of small consequence; but if desirable to maintain the right and left as before, the command "Form close column, facing left, left ground," would do it, because the companies would then march left forward fours left and on left into line.



Par. 346. Observe the unnecessary confusion of commands here. The companies want to know what formation they are going into, not what they are coming out of. So "form line" is better than "deploy column." Here the commands would be: 1. Form line, facing front, right ground. 2. March. Just the same command again yet it describes all that the companies want to know. The first company executes "fours right" and "on left into line." The others right forward fours right in succession, column right and on left into line when arrived at their proper places.

In movements by platoons, it will be seen first that when the company is in column of fours, it can be formed in column of platoons facing front, right, left or rear, by means in all respects similar to those described above for forming a battalion in column of companies, and I think no difficulty can be found in applying the principles to the battalion platoon movements. Enough has been given to show what the principles are and how they are to be applied.

In the evolutions of the regiment they can be used and the commands and movements worked out with similar results as to simplicity.

The commands are always to indicate the three things which the battalions want to know. That is, the formation, the facing direction and the ground. The movement always passing into and through the column of fours, and supposing the head of column to be on the ground where the formation is to stand, the leading organization begins forming up at once and each link of the body follows the head by the snake or chain like process of on right or left into line.

I have stated somewhere above that it is of little consequence in most circumstances if in the progress of any movement, the right of the company becomes the left and the left the right. This is true as a rule, on the parade ground; but I think also that in some circumstances it is better for the commander to have his troops in the normal order, with the first sergeants and the senior platoon commanders on the right. So, in my opinion a movement should be introduced in the regulations for reversing. The command could be "reverse company (or reverse companies or battalions)" and the execution would be simply, right forward fours right, column left, fours right.

I have also said that, to save time, all movements could be executed in double time. This is the way I would have them done.

At the command to form column of fours, that is fours right or fours left, I would have the fours wheel and halt. In order to wheel and proceed I would command "continue the march, fours right," but in forming column of fours to begin a new formation the fours should wheel and halt. Then the command for the new formation should be given slowly enough and clearly enough for all to form a clear conception of the three elements of the command, that is the formation, the facing direction and the ground. It would be especially important that the leading company understood; the others by following chainlike, would see what was being done and conform.

At the command march and without further command the troops would trail arms and go into their new position at a double time. The step should be short and quick, but never a run. As soon as each subdivision completes the movement it should stand at ease.

## Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

### "The Military Academy and the Education of Officers."

Brevet Major-Gen. George L. Andrews, Professor U. S. Military Academy  
(retired).

THE spirit of the paper on this subject by Lieut. E. W. Hubbard is temperate and in the main fair. Such a discussion, with the object not of advocating certain opinions but of placing the subject in a true light, should not fail to be useful, whether it be immediately followed by action or not. In these comments upon his paper, there is of course no attempt to consider in detail all that he has set forth, or to give a full discussion from another point of view. Nor is any particular attention or value claimed for the opinions herein expressed, other than such as they may in themselves seem to merit.

Too much credit is often given to the founders of the Republic for their views in respect to military education, the diffusion of military knowledge, and the encouragement of a military spirit among the people, inasmuch as those views had little effect upon action. It is true that the Military Academy was established; but this was done slowly, reluctantly, and so grudgingly that during the first ten years of its existence the Academy was often on the point of perishing from neglect. Little else was done to prepare for war, however imminent war might be. It cannot be said that the outbreak of war has ever found our country prepared; nor is the prospect good that due and timely preparation will be made for the future. The lessons of the Civil War have had some effect, but how little of what is evidently necessary has been done since the close of the war thirty years ago! Attention is engaged by other matters. Disrespect or undue disparagement is not intended; but credit should be given only where it is due, and the facts of the past should be borne in mind in considering what is practicable in providing for the future.

That the parts of our system of military education need to be harmonized as well as separately improved, will hardly be denied. The difficulty is to determine what is expedient and practicable, and then to induce the necessary action. Probably a better result will be attained by a steady and persistent effort for gradual improvement, than by any attempt to make all desirable improvements at once.

The value of military schools will at this day hardly be contested. It is not necessary, perhaps not desirable, that all officers should be graduates of such schools; yet it is believed that those who are graduates will in general compare very favorably with officers drawn from other sources. Not every graduate can be a successful general; but it should not be forgotten that in our Civil War the great generals on both sides were graduates of the Military Academy; and it is said that a large proportion of the generals of the French and the German armies come respectively from the Military School at St. Cyr and the German Cadet Schools.

What Lieut. Hubbard says of the Military Academy is well worth considering.

Naturally the curriculum calls for a large share of attention; and in the discussion thereof, some of the disadvantages of the excessive prominence given to mathematical studies are well set forth. However, the opinion that "mathematics is peculiarly adapted to training the mind of the soldier—in fact that it should be the principal study in any system of military education," cannot be regarded as "general," except possibly among graduates of the Academy, and others who have given the matter no careful consideration, and who without further inquiry accept mere assertion. In the prominent military schools of the world, except the Academy and the French Polytechnic School, mathematics is a more or less prominent but not the principal study. The question at issue respecting the study of mathematics at the Military Academy is mainly one of proportion, and according to Professor Bain, "next to confusion [in studies] there cannot be a greater evil than disproportion." It is contended that in the course of study at the Academy the proportion of mathematics is much too great. Nor can it be conceded that the proportion of mathematics is satisfactory if all graduates are to be engineers. A much less amount of mathematics, and that less abstract and more practical, answers the purpose of the engineer, civil or military. Neither engineering nor anything in the military profession is mainly a matter of mathematics. Advocates of the present course of mathematical study at the Academy have sometimes referred to the fact that by that course some graduates have been enabled to render, in special positions in civil life, distinguished services creditable to themselves and reflecting credit upon the Academy. But it is not the object of the Academy to qualify persons for such positions, and a course of study for all should not be arranged for the possible benefit of the few.

Though the Academy, with substantially its present course of study has gained a high reputation and has rendered most valuable service to the country, yet surely this is no reason why the curriculum should not be improved. Referring to the intense conservatism of the Academy, it has been well said that "there is no civic college in the country whose professors would boast that there has been no substantial change in the curriculum since 1840 or thereabouts."

More than forty years ago, a Board of Visitors remarked: "It strikes the Board at once that, if we take away from the course of instruction in the Academy all that must be regarded as professional, we leave a residuum of elementary and general culture which in the just judgment of no man can be styled liberal." The same Board also referred to the disadvantages under which certain other studies were pursued "in an atmosphere in which the exact sciences and their applications constituted the all-prevailing and controlling element." However, the Board did not even suggest the question whether it was either necessary or expedient that such an "atmosphere" should continue; but like other Boards suggested the addition of a year to the course, in order to give time for "the more liberal studies of an enlarged academic course." This plan was afterward tried and found not to answer expectations. It did not change the "atmosphere."

Doubts of the expediency of the predominance of mathematical studies at the Academy have often been expressed, but no action has followed, nor has the matter been much discussed. The very positive assertions of advocates of the present course seem to have been practically accepted as conclusive. Yet it is certain that no question concerning the curriculum is more important or more urgently needs consideration and decision.

The decision of that question will naturally affect the method of instruction in mathematical branches, and on that point no comments are here offered. It is believed, however, that for nearly all cadets the utility of the study of mathematics will be mainly as mental discipline.

Lieut. Hubbard's remarks upon the method of instruction in French seem to indicate that he has not fully considered the subject. No doubt a correct pronunciation of French is desirable, but it is quite possible to devote in the class-room too much time and attention to the effort to teach such pronunciation. The object of the study of a foreign modern language in a school or college ought not to be the acquisition of a speaking knowledge of that language; nor would such a knowledge even if attainable be the most valuable result of the study. Those who think otherwise would do well to consult what has been said on the subject by persons who have carefully considered it, especially by experienced professors of modern languages. Most cadets pronounce English carelessly and imperfectly, have not a correct ear, and even with good-will find it difficult to overcome the effects of long continued error and carelessness in pronunciation. The persistent tendency of most cadets to keep the mouth nearly shut, and of some of them to keep the jaws tightly closed, in speaking or reading, has often been noticed. The bad pronunciation of English by the cadet greatly affects his pronunciation of French, and his mis-pronunciation of the latter is by no means wholly due to "lack of instruction and practice at the beginning." The cadet who is indifferent to correct pronunciation of English, is not likely to be much interested in correct pronunciation of French. Unless it has been done quite recently, cadets have never been "required to memorize page after page of rules and exceptions." For young men whose vernacular is English, the acquisition of a correct pronunciation of French is by no means easy, and will in most cases not be accomplished by any method practicable in the class-room. The experience of the past at West Point, is very unfavorable to the employment of Frenchmen as instructors of cadets; indeed, it is hardly conceivable that any one knowing much of the history of the Academy should recommend such a thing. No disrespect to Frenchmen is intended; but they certainly have not in the past shown themselves capable of properly controlling cadets. If satisfactory instructors cannot be had from officers of the army, let civilians be employed; but let them be Americans.

What is meant by the assertion that "French is now studied and recited in a mechanical way" is not clearly understood; nor is it perceived how the study is to be relieved "of much of its present monotony" and "a healthy stimulus given to the acquirement of the literature of the language and to a speaking knowledge," by the method outlined by Lieut. Hubbard, of which the sole distinguishing feature appears to be careful drill in pronunciation under French instructors. Judging from the past, the principal relief from monotony thereby attained would be through the fun introduced.

The subject of the overcrowding of the courses of study certainly deserves consideration. But there is no little danger of hasty conclusions which a careful examination would show not to be warranted. For instance, Lieut. Hubbard states, as showing in a general way the increase in the courses, that the grand total of the general merit rolls in 1878 and 1893 were respectively 1950 and 2345, an increase of about 20% in fifteen years. But examination shows this to be no such indication as it is asserted to be. Changes in the relative merit numbers assigned to studies have often been made with no corresponding change in the studies themselves. The grand total in 1851 was 2250. Comparing the general merit rolls of 1878 and 1893, the items of increase are Mathematics 100, French 50, Drawing 25, Practical Military Engineering 45, English 75, History 75, Ordnance and Gunnery 25. In the first four of these, there was no increase in the studies; the time for English was taken from French, Spanish being transferred from the third to the first class; the time for history was taken from Spanish; Chemistry and Mineralogy and Geology were joined in one course in the second class, and here may have been a little crowding, which however is not shown

by the general merit roll ; the course in Ordnance and Gunnery was slightly increased. It is evident that an increase in the grand total of a general merit roll is not reliable as an indication of either the fact or the amount of an increase in the courses of study. For several years the Academic Board has steadily opposed any increase in the aggregate amount of study required of cadets. However, it is quite possible that, through changes in courses and text-books, some increase has crept in ; but it is much to be doubted that the increase in fifteen years amounts to so much as twenty per cent. This can be determined only by careful investigation.

It would not be wise to reduce the course so much that it could be readily received and completely digested by all that are now graduated ; part of the digestion must take place later. Moreover, it is always to be borne in mind that a considerable number of the young men admitted to the Academy are neither by capacity nor by attainments properly qualified for the places they fill. Such cadets must find themselves overtaxed ; but the blame of this properly rests, not upon the Academy, but upon the present system of nomination of candidates. Faithful, diligent study is, and ought to be compulsory at West Point ; nor should there be much "tempering of the wind to the shorn lamb." If it can be fairly shown that the present courses of study, or any hereafter prescribed, are too much extended to serve to the best mental development of faithful, diligent students, of fair capacity, let the courses be shortened ; but let there be no concession to indolence or to low capacity.

That the standard of admission should be raised is highly desirable, but is hardly practicable so long as the present system of nomination of candidates remains unmodified. If admission by competitive examination is to be successfully adopted, the examinations should be by uniform operation of law, not be left to the discretion of members of Congress.

The statement is made that "a low standard of admission is not an entirely un-mixed evil ; the Academy now starts at the bottom and can be sure that the foundation is properly laid for the subsequent course." A similar statement has been made by others. The idea that a low degree of attainment on the part of the candidate is a positive advantage, certainly seems singular. When and where is he to make up for what he has failed to acquire before entering the Academy ? or is all that of no importance ? The advantage of having to commence at the bottom the education of a young man of seventeen to twenty-two years of age and complete the same in four years is not perceived. It is found that nearly all cadets who stand well in their classes have been comparatively well prepared to enter the Academy. A young man admitted with a low degree of attainment, is very much in the situation of one almost untrained to manual labor who should suddenly find himself in a position in which he was required to perform daily as much of such labor as he could fairly do if he had previously been properly trained for it. Hence we see as one of the results of a low standard of admission, loud complaint of overcrowding of courses and overtaxing cadets.

The objections to a preparatory school and to a course of five years are briefly and well stated.

As to the suggestion that Spanish and Drill Regulations be omitted, it should seem that the question of what studies are to be omitted, or what new studies are to be introduced, might better be considered after the decision of the great question of the continued predominance of mathematical studies. But a reason assigned for the proposed omission, namely, that Spanish and Drill Regulations "are studied by the cadet principally for the marks they give," calls for remark. The cadet is a warrant-officer of the army, and is as truly in the military service of the country as he ever will be. Under these circumstances, he ought honestly and fairly to study the prescribed course, as well as faithfully to perform all other duties that may lawfully be

laid upon him. He is neither competent nor authorized to form his own opinion of the merits of studies or other duties and act upon that opinion. The fact that he sees fit to disregard his obligations and neglect as much as he can one or more studies, is no good reason that he should be relieved from those studies. Studying mainly for marks is by no means confined to the two branches named, and it is well known that cadets often study only or mainly those parts of the lesson upon which they have calculated that they will be called upon to recite.

The reorganization of the present courses of study at West Point and all the post-graduate schools should be gradual. No commission competent by knowledge and experience to do such a work all at once, could possibly be organized. To undertake so great a matter would be likely to result in as much harm as good. A permanent supervising commission or "board of improvement" was recommended by General Thayer, and if properly organized and restricted would undoubtedly be very useful. No recommendation affecting the course of study should be made by the commission or board without having previously heard fully on any proposed change the Academic Board or the corresponding body of the school affected; and the expression of their views should in all cases accompany the recommendations, which before being carried into effect should require the approval of the Secretary of War. Little good is to be expected from a commission constituted like that of 1860. It is further suggested that a properly organized permanent commission might advantageously replace boards of visitors. These boards have undoubtedly been of service in the past, but mainly in removing prejudice excited against the Academy by its enemies. For this, there now seems to be little necessity; the boards are not properly organized or sufficiently permanent to exercise wise and effective supervision, their recommendations receive little attention, and between these boards and a permanent commission or board some clashing would probably occur.

Space does not permit full comments upon what is said of post-graduate schools. In the main, the suggestions seem to be judicious.

Upon the expediency of increasing considerably the annual number of graduates of the Military Academy and discharging the excess over the number of vacancies to be filled, a decided difference of opinion exists. Without entering upon a discussion of this matter, it may be said that there are good reasons for believing that such a course would be injurious to the Academy, while compensating advantages would not be realized.

In conclusion, it must be said that Lieut. Hubbard has furnished a very interesting paper, the result of a great deal of thought, written carefully and in a good spirit. It will doubtless receive the attention it so well merits.

#### **Professor Charles W. Larned, U. S. Military Academy.**

In his paper upon the Military Academy, which appeared in the January issue of the JOURNAL, Lieut. Hubbard criticised:

- 1st. The preponderance of Mathematics in the Curriculum.
- 2d. The assumption that the analytical reasoning of Mathematics is the best training for the mind in any general system of education, and more particularly that of a soldier.
- 3d. The methods of instruction as applicable to non-mathematical subjects.
- 4th. Want of practical and inductive methods in most of the courses.
- 5th. Overcrowding of the courses individually, and general congestion.
- 6th. The nature and number of subjects taught.

He has written this paper after some years of experience as an instructor at this institution, and undoubtedly as the result of earnest conviction and considerable



thought. It is creditable and well written, and he will find many to agree with him in some of his strictures—few, I think, who will agree with him all through—but he has voiced with reasonable fairness a growing mass of opinion as to certain points of weakness in the curriculum, and methods of instruction.

The contention as to the relative value of the Mathematics is an old one, and was taken up very emphatically by Sir William Hamilton in an article in the *Edinburgh Review* in the volume for 1837, if I remember rightly; and still later received notable exploitation in Germany in connection with a controversy respecting the relative merits of the Real-schulen and the Gymnasias.

The proper combination of analytic and inductive methods in systems of education is still an open question, and the congestion of studies in collegiate courses is an evil by no means confined to the Academy. As to the nature and number of the subjects taught, this is a matter of nice discrimination the decision of which is generally forced by urgent necessity, and is often a matter of compromise. Where there is a steady progress in all branches of knowledge the replacement of the old by the new requires a constant readjustment.

I do not desire to dwell here upon the critical, but the remedial element in Lieut. Hubbard's paper. It is the latter with which we are most immediately concerned, since we stand in with all educational institutions the world over in the possession of defects. It is not merely that all institutions of learning are fallible, but there are none of a general character, I believe, in which serious defects would not be admitted even by their governing bodies. The fact is, education is not in itself an exact science. Its scope and methods are not reducible to definite laws for the reason that its objective ever lies in the region of the unexplored, and its needs are a function of the growth and demands of society. What is an education? is a question no man can answer as yet—not even though it be a military education. In the case of the Academy let it be remembered that the question must be answered from both aspects, for it is not alone the soldier we must educate, but the man as well. Therefore when inevitable defects are discerned and admitted, the remedy proposed is the matter of vital interest, that we may know as clearly as possible whether, after all, the disease is not the preferable alternative.

One essential truth must be borne in mind, namely:—*that all educational institutions of the highest order are growths* and not Minerva-like creations. Their excellence is the accumulated product of many minds working to a common end, and applying the results of experience wisely to new requirements of development. The highest good they represent has grown with and into their identity, and forms a tradition of special influence which is typical of any particular school. Any very sudden and violent shock to such a system may destroy its vital principle, or change its entire character for the worse. As pertinent to the institution under discussion it may be observed, that the only wholesale and radical reorganizations attempted at different periods of its history at the suggestion of commissions were, after trial, abandoned, and reform was left to the slower operation of natural growth.

But it is precisely a radical and sweeping change that is proposed as a remedy for our shortcomings—nothing less than a wholesale reorganization of the Military Academy with reference to the post graduate schools of application. Why not, by the way, a reorganization of these last with reference to the Academy? Is it not the parent of them all? Lieut. Hubbard is so entirely possessed with the merits of the Superior Commission with its plenary powers that he hurries over with somewhat contemptuous impatience the one gross and fruitful source of the very ills he deplures, and slurs its importance in a way suggestive of a fear that it may diminish the value of this panacea. As a matter of fact if one seeks for the full and sufficient cause of the congestion of the curri-

culum and dislocation of courses it is exactly in the preliminary examination and nowhere else that it is to be found. Nothing more entirely incongruous and inadequate can be found in education than the relation of the entering requirements to the subsequent course of instruction. *It is precisely because the greater portion of the material supplied the Academy is of so low an educational grade that the subsequent course is loaded with a mass of work that has no proper place in a military institute of technology.* There is no parallel for such a state of things in any school of like grade in the world. Compared with the requirements for entrance into the leading Military and technological schools of the world the preliminary requirements here are infantile. Even our sister Academy at Annapolis, whose pupils enter at an age two years younger, requires a higher test and adds algebra to the list. All talk of a larger range of selection, of opportunity afforded poor, deserving, and able young men, has no application so long as there is a difficult scientific course to be mastered of a high grade for which no preliminary training is to be supplied. The same reasoning would apply to reading, writing, and arithmetic. Why require these? All preliminary examination might be omitted, except the physical, provided a preparatory school were in the scheme of education; but so long as this is not a part of the system, either an adequate test must be provided, or the regular curriculum loaded with extraneous and primary matter to supply the want. The present conditions involve an extravagant waste and needless expense to the Government, the school, and the individual. Young men are induced to come whose inadequate condition makes their subsequent hopeless struggles to keep up sheer cruelty; the time and powers of the instructors are squandered in fruitless efforts to cultivate barren ground; the Government has expended large sums of money without return, and beyond all this, the whole system has been weakened so that those who are unqualified to remain fail to get that to which they are entitled. Were the Military Academy given a preliminary standard of fair average merit the congestion in studies would be very greatly, if not wholly, relieved; for, not only would the relief operate directly in the elimination of subjects, but there would result a higher grade of students better equipped for the work before them.

Now as to this matter of congestion, about which so much has been said, I am of the opinion that the extent and effect are greatly overrated. So far as it means an exhausting drain upon the energies of cadets, I regard it as wholly erroneous. I doubt if so healthy, well balanced, and light hearted body of students can be duplicated in any other institution. I do not recall but one instance of breakdown, during my twenty-one years service here, due to severe study among those who have passed the first eighteen months of the course, and in this case the underlying cause was consumption. Among those who have been sifted out during this probative period, some have been compelled to excessive effort from the very cause just discussed, and owe to inadequate preparation both their failure and the unnecessary strain on their energies. They have thus incurred the stigma of failure, and been placed unnecessarily in a false position, by a misleading and absurd preliminary test.

So far as I have been able to ascertain the amount of average hard study does not exceed, if it equals, that exacted in some of the technological schools of the country of the same grade. The Boston Institute of Technology; the Rensselaer Polytechnic; and the Stevens Institute carry instruction to a higher grade, with students of no greater average maturity, and demand a proficiency which has given them a national reputation. They none of them have the immense advantage of our perfect disciplinary system and gymnastic training. It is an open secret that in the severe course of the second class year cadets still sleep and amuse themselves on alternate afternoons during the period allotted to study. All of the cry of "congestion" and "over pressure" comes from or concerns those whose abilities and preparation are inadequate to their task.

A few words regarding the Superior Commission upon which Lieut. Hubbard relies for a solution of our difficulties. This commission he would have a permanent one with ample powers to carry out its recommendations, and its membership would be a matter of detail, having representatives from civil as well as army life. This would be nothing less than a grand superior Academic Board—both an executive council and court of ultimate appeal—having full authority to alter or annihilate at its discretion; directing academic instruction, but not a part of or in contact with it. The civilians in it would be wholly out of sympathy with our military tradition, and the army members would, perhaps, be graduates or non-graduates with various grievances or untested theories with which they would be eager to experiment at once. There is unfortunately no subject regarding which there are more theories and theorists than education. The stability of the Academy would be shattered forever, and a period of experimental anarchy would supervene. Such a commission, if it has a useful function, might find it (minus the civilian element) in the supervision of a Staff College and Schools of Application, which are directly in contact with, and a part of, the practical activities of the army, but would be to the last degree demoralizing and injurious to an academy of general and elementary education. There would be hopeless friction and discord between the two governing bodies, and that wise and steady conservative influence that has built up "line upon line, precept upon precept," all that is most noble in the character and tradition of the United States Military Academy at West Point would be gone beyond recall.

Lieut. Hubbard does great injustice, I think, to the Academic Staff of this institution in ignoring the steady progressive tendency of its labors in the development of its work, and the gradual but increasing movement towards the practical and inductive methods he describes. There is a disposition to make haste slowly in all matters involving change; to hold fast what is good, and prove all things; but the authorities of the Academy are not blind nor indifferent to the value of new methods where they can be safely applied to a system which, whatever its defects, has won the applause of the world for its thoroughness and remarkable achievements. There is no doubt that, in entering the new Academic Building with vastly improved appliances and facilities, all the courses will receive a new stimulus, and that the opportunities afforded for instruction by project and experiment will be fully taken advantage of. The equipment of the Academy has never before been adequate to work of this nature, and it will be well for all who are impatient of old methods to await new developments under new conditions.

I wish to add only a few words in defence of the method of instruction in French, which is most unjustly attacked. Lieut. Hubbard's views are, I think, very much in error. He lays great stress upon pronunciation and very little upon translation. The course of instruction very wisely does quite the converse, for the simple reason that, with the material to be worked, the one is practicable while the other is not. A very remarkably proficiency in translation and composition, considering time and material, is attained which could not possibly be reached were the time spent in an effort to acquire what comes only with long residence and conversational opportunities. Nor is there anything mechanical in the renderings at sight given by the large portion of the graduates in this subject.

West Point has won for itself a place among institutions of learning altogether unique and admirable. Its power as an educator is a subtle blending of various influences that have grown into its very being, and towards which each of its parts—disciplinary, academic, and social—contributes a due share. It is a very serious matter to tamper with the nice adjustment of so delicate and powerful an organism, and to intrust its development to an alien and changing body would be a fatal mistake.

I do not think that at any time in its history has the Academy been more vital, or possessed greater possibilities for good. I have had the honor of sitting as a member of its governing body while there were yet with it some of those whose names are famous as the builders of its reputation; but at no time has there been a more harmonious, vigilant, and conscientious activity, or a more earnest desire to build worthily upon the noble structure laid down by the great founders of our Alma Mater than at this day.

**Professor S. E. Tillman, U. S. Military Academy.**

The temperate expression of this paper combined with a somewhat full statement of the desirable and possible alternatives in many of the cases considered, make comment seem at first sight almost unnecessary, but readers not fairly familiar with the Academy and its affairs will, I think, be led by the article to some erroneous conclusions and unjust judgments, especially as to the institution's efforts, the obstacles to be overcome, and partly as to its methods. I do not in the least mean to imply that the writer intended any such results; on the contrary, having been himself recently on duty at the Academy he appears to assume that his readers are as well informed as he. Brief reference to certain parts of the paper will, I am sure, help to a fairer understanding. The paper as a whole involves too many considerations for a full discussion here and my comment will touch only that portion of the paper relating directly to the Military Academy and more especially that pertaining to the branches of natural science included in the Department of Chemistry, Mineralogy and Geology.

The first statement to which I refer as likely to mislead is—that the course of study is essentially the same as it was left by Gen. Thayer sixty years ago. Such expansion and development have taken place in all the departments that this is true, as to the studies, only in the very broad sense that they relate to the same general subjects and bear the same names as then. The Department of Ordnance and Gunnery, of Practical and Military Engineering and of Spanish (now in the Department of Modern Languages) have all been added since Thayer's time.

Taking the M. A. alone the defects as given by Lieut. Hubbard may be summarized as follows:

1. The curriculum unsatisfactory; too mathematical.
2. Antiquated methods of instruction prevail in some of the departments.
3. Courses of study overcrowded.

Lieut. Hubbard devotes but small portion of his space to the curriculum, and makes the following suggestion in regard to it: "In considering changes to be made, it would be well to inquire whether the West Point course is not too mathematical." Whether the curriculum is too mathematical is a fundamental question in connection with all material changes contemplated at West Point, and I think that no one will object to the suggestion quoted above.

**Antiquated Methods of Instruction.**—Under this head Lieut. Hubbard repeats certain well-established and well-recognized principles in regard to teaching natural science (combining practice with theory) to which there is no disposition on my part to take exception. He also suggests a method for saving time in order that these principles may be put into practice (fewer reviews and the omission of the less important parts of the text-book). It is a legitimate inference from his paper that the above principles are by the authorities not deemed applicable here and that there is no disposition to put them in practice; also, that the time-saving method has not been thought of, or at least, not adopted.

The following extract from a statement of mine submitted to the Board of Visitors ten years ago, found in their report for 1885, shows my opinion in regard to the principles that should apply in the teaching of natural science. \* \* \* "The fact that

the time\* is very limited would seem to be additional reason for perfecting the means of instruction. The natural sciences cannot be studied to the best advantage in entire independence of the experimental evidence upon which they rest. To study them without experimental evidence is to lose, to a large degree, the inductive training which they should give and the cultivation of the powers of observation. Especially is it true that the facts and principles of chemistry should be closely associated with the experimental evidence upon which they depend. Such experiment increases, beyond expression, the interest of the student, and at the same time serves to better fix in the mind the principles of the science. An institution without the facilities for some experimental work on the part of the student is not prepared to teach the subject to the best advantage. It is not intended nor desired to make, in any sense, specialists of cadets, but neither the mental discipline nor the permanent knowledge which the science should give, can be obtained without facilities for experiment."

The statement from which the above extract is taken, was submitted for the purpose of obtaining the Visiting Board's recommendation for a building with facilities, among others, for practical work in chemistry and electricity, as well as in mineralogy and geology. The Board of Visitors unanimously recommended an appropriation of \$175,000 for the desired building. The Superintendent of the Academy asked for it in his annual estimate, but the then Secretary of War did not deem it necessary; this last fact illustrates one class of obstacles that our efforts sometimes meet.

The Academic Board had asked for increased facilities before this time, but after this date the agitation for them was continuous and resulted in the new Academy just completed. In all the plans of proposed buildings ample facilities were asked and provided for by the Academic Board for practical work in the sciences above named, and there is now in the new Academy a chemical laboratory capable of accommodating 80 students and an electrical laboratory with facilities for 30 students, at one time. This action of the Board in providing facilities for practical work in these sciences, shows that it would be incorrect and unfair to infer that the "authorities at West Point" were opposed in belief or lacked disposition to practice the principles of teaching science, advocated by Lieut. Hubbard.

Again in regard to the method for saving time in order that these principles might be put into practice (omitting reviews, etc.),—this method was adopted more than ten years ago and has resulted in more extended practical work in mineralogy and lithology and especially in electricity. Where practical work is not possible these reviews it should be borne in mind are not useless. They extend the time of the course and give greater opportunity for acquisition and assimilation of the matter taught. Such reviews when judiciously arranged, are very beneficial in this respect. While no exception is taken to Lieut. Hubbard's statement as to the advantages and principles of science-training, it must not be forgotten that short courses are unavoidably deprived of a relative proportion of the inductive training that belongs to the experimental sciences. In *very* short courses the greatest advantage will accrue to the students by making the acquisition of sound information the main object and the practical work subsidiary to this. The discipline and training peculiar to these sciences cannot be made the primary object in *very* short courses. The combination of theoretical and practical work is the best in all cases but the proportion of the two cannot, to the best advantage, remain constant in courses of different lengths.

In stating that the acquisition of information must be the primary object in *very* short courses, I do not admit that such object necessarily involves little discipline. There is a great variety both in amount and difficulty of what comes under the head of

\* This refers to the very limited time devoted to the sciences included in the Department of Chemistry, Mineralogy and Geology.

information and the higher degrees of information in the natural sciences afford abundant opportunity for acute discrimination and quick perception in discovering the true relations between phenomena and in following the transformations of matter and energy. Every adult has been a more or less good observer of natural phenomena all his life and he is already prepared with a large number of experiments to interpret, as his knowledge of principles increases. Fully believing in a combination of section-room and laboratory work I yet hold that a high order of mental training accompanies the proper teaching of science without any laboratory work on the part of the student, to say nothing of the useful information that results. To obtain in the greatest degree the unique disciplinary value that attaches to the experimental sciences would require a much longer course of study than is now available or than can probably be made available with due regard to the fundamental objects of the institution.

The overcrowding of the courses.—This is a point now often dwelt upon, and it is not a new suggestion, as we see from Lieut. Hubbard's quotations that it has been made at intervals since 1860. There may be some grounds for the belief, but in my opinion, the grounds are not substantial and the overcrowding is much exaggerated.

Lieut. Hubbard says, "Without going back to the sixties a comparison of the cadet Registers, 1878 and 1893, will show a marked increase all along the line, not only in every department but in every course of study, almost without exception." This comparison of Registers merely gives the lists of books in the different departments and would be very misleading as evidence of overcrowding. In the efforts to improve the courses of study and get the best text-books it is sometimes necessary to take parts of two or even three books to replace one. The titles of all these new books appear in the Register instead of that of the replaced book; the number of such titles in the Register is thus increased, though the course may be simplified or even shortened. It has become a general custom here when a book is being rewritten to use such portions of the new book as may be completed in place of the same subject matter of the old book, thus the title of the old book and that of the finished portion of the new one will both appear in the Register. This changing and rewriting of text-books makes impossible any accurate comparison of the courses by means of the titles of the books in the Register. Almost immediately following the above extract Lieut. Hubbard admits that no rigid comparison can thus be made, yet this comparison of Registers still remains the strongest evidence of increase that he offers.

He says that this increase in the courses of studies may be shown in a general way by the grand totals for general merit. This method is not more accurate than the comparison of the book-titles in the Registers. The inaccuracies of this method arise from the assumption that the increase or decrease in the general merit of a subject necessarily involves an increase or decrease in the subject matter of that study. This is not so. As a pointed illustration I refer to the fact that in 1888 mathematics for the first time was given a count in the general merit of 400 without any increase in the subject, 300 having been its previous count. In 1892 Practical Engineering was given a count in general merit of 45, it having had no count before. The grand totals for a number of years back will also illustrate the unreliability of this method, as follows: 1854, 2250; 1865, 2200; 1870, 2350; 1877 to 80, 1950; 1887, 2075; 1893, 2350.

If from the grand total for 1893 we deduct the additional count (100) that was given Mathematics for the first time in 1888 (not for any increase in the Course) and also the count of forty-five that was given Practical Engineering in 1893 for the first time, it will be seen that the grand total for 1893 is less than it was in 1854 and the same as in 1865. The evidence for overcrowding as adduced by Lieut. Hubbard seems to me to be insufficient.

In comparing overcrowding now with the pressure in studies that may have existed



at any previous time, the better text-books, the increased and improving facilities for instruction and, it is thought, the better instruction should all have weight in favor of the present. If wholesome physical condition and pleasant mental relaxation are conducive to more satisfactory mental effort there is added another factor to the side of the present, for surely these essentials of mental and physical vigor have never been attended to as at present.

In my opinion there is no greater effort in studies required of cadets now than in all the years I have known the Academy (since 1865), yet they acquire more knowledge and equally good training. Such overcrowding as exists has existed for a long time, and is not a defect to be attributed especially to the present. With the same courses of study it cannot be altered except by raising the standard of admission or lowering the standard of graduation.

Lieut. Hubbard suggests six possible methods of partial relief for pressure of studies as follows:

1. To raise the standard of admission.
2. To establish a preparatory school for West Point.
3. To make the course of studies extend over five years.
4. To retain the four years' course and make a division of the classes at the end of the second year.
5. To omit parts of the present courses.

All of these have received frequent consideration by the Academy authorities. The long and continuous efforts to secure the first shows that it is heartily approved here. Personally, I agree with Lieut. Hubbard that the second and third are inadvisable. Under modified conditions, I think that the fourth might accomplish excellent results. In regard to the fifth, I can say that the West Point authorities have within a few years had direct and positive evidence that the then Secretary of War and the General of the Army did not agree with Lieut. Hubbard that "Spanish and Drill Regulations can be omitted with positive advantage." It was held that the intimate relations of peace and not the prospects of war with the South American countries made Spanish more important than ever.

Lieut. Hubbard's sixth proposition "To entirely reorganize the present West Point course in connection with the higher courses of the Post Graduate schools," involves a discussion that I am unable now to undertake as it would carry me much beyond the object that I had in view, viz., to present to the general reader certain facts that appeared to me necessary to fairer conclusions in regard to the present conditions of the Academy itself.

#### Major Philip F. Harvey, Surgeon U. S. A.

In complying with the invitation of the Publication Committee to furnish the JOURNAL some comments on Lieutenant Hubbard's essay in the January number, I am well aware that my remarks are not to be taken as *ex cathedra*. The subject however is one about which considerable difference of opinion exists and is so vital withal to the interests of the service and the country that some advantage may result from an expression of views from different standpoints.

Varying views regarding the West Point course are entertained, some decidedly approving the present curriculum, a larger number favoring modifications of it, and some advocating its entire reorganization. In addition to the above there also exists a small faction which would abolish West Point altogether. These divergent views prove if they prove anything, that the highest results have not yet been attained at the Military Academy, and so long as progress in the arts and sciences continues, the highest development can only be secured by advancing with them.

There has ever been a tendency in human nature to carry that which has been



found good to an extreme. A belief prevails, and has not lacked expression, that this extreme has been reached in the use of metaphysics and the pure mathematics in the mental training at West Point. *In medio tutissimus ibis*, is a maxim which holds the same measure of truth to-day as when first formulated. Extremes of all kinds are fertile sources of error and failure.

Lieutenant Hubbard is fairly entitled to praise for his able summing up of the question. His tone is calm, philosophical, impersonal. His thesis is well thought out, consistent and supported doubly by his own studies and the wisdom of experts.

The arguments advanced by Lieutenant Hubbard to prove the fallacy of relying upon mathematics as the criterion by which a student of an inexact science is to be judged and ranked, amount almost to a demonstration. Nor is it probable that any experienced teacher will dispute the correctness of his position concerning the inestimable value of object lessons and personal work in arousing an abiding interest in and a practical knowledge of, the natural and applied sciences.

No observant person who has been brought in contact with the Corps of Cadets has failed to note that much of their mental work is not done *con amore*, but under the stress of necessity and by the exercise of sheer will-power. Instances are not wanting to show that the draught upon their mental and physical resources has been carried to the utmost verge of endurance and resulted in a temporary break-down, for which a complete suspension of work for a time has been necessary to bring about recuperation. It is therefore small wonder if under these circumstances mental work becomes distasteful and is gladly relinquished for some years after the goal of graduation has been reached.

It has been well said that education is the full and harmonious development of the powers and capacities of man : full, *i. e.*, each to the highest point of which it is capable ; harmonious, each in complete unison with all the rest. An essential object of an academic education is the cultivation of a thirst for knowledge which is the basis of all inquiry and advancement. Any system is faulty that defeats or impairs this object. At best the West Point curriculum can only supply the corner stone upon which the future officer is to build, but he should go forth thirsting for that larger knowledge he is to acquire in the practical pursuit of his profession. He must ever be a student, and the prospect of his attaining the full development of his capacities will be diminished if study becomes repugnant to him during his academic life. The years he spends at the Military Academy may be regarded as the critical period of his career, and his future depends in great degree upon the impulse then given to his maturing faculties. It is preëminently the time for the formation of character and the cultivation of correct habits of study and of conduct.

All men are composite in their nature ; intellect, feeling, and will, unite in varying quantities to produce as many varieties of character as the octave of notes, by transpositions, yield myriad harmonies and discords. Out of these elements of character it is the task of the teacher to fashion his pupil so as to qualify him for future usefulness in the line of his chosen calling. The task of the teacher is a dual one—1st, to impart and implant clear and correct ideas of the branches of learning he deals with, and 2d, to cultivate the higher instincts and intuitions, for from these spring the most perfect operations of the mind. The higher manifestations of genius are from this source, incited by latent impulses of thought independently of the slower steps of reason. True educators attach great importance to this quality of intuition. Bacon said that men are prone to set too high a value on their acquirements and underrate their faculties. Perhaps West Point is not wholly free from a common error of confusing education with instruction. A vast amount of instruction may produce but little education. It is not the man who knows the most, but the man who can do the

most ; not the man who can recite a formula most correctly, but the one who can best apply it practically, who is best educated. In other words it is not the mere amount of ground the student covers by his studies in the shortest given time, but the wide-reaching grasp he obtains of their bearings upon the practical affairs he is to deal with, and the healthful influence they exert in the growth of his individuality, which afford him the most profitable results. A recitation may be perfect but parrot-like, and may find no permanent registry in the higher thought centres for subsequent use. If intellectual activity is not stimulated, and independent and self-reliant thought not fostered by a system of education, no matter what sphere the pupil may be destined to fill, it fails of its highest purpose. Better a natural act of originality, however rude, than the workings of a machine.

It is natural that a school occupying a place apart from the other educational institutions of our country, having an inflexible code, hampered by tradition and not experiencing the stimulus of competition, should become somewhat dogmatic and reluctant to adapt itself to advancing ideas.

It is not my desire to depreciate the educational system at West Point. Any attempt to do so would argue an imperfect comprehension of it, for a general survey of it shows that it embodies much that is well adapted to the ends in view. Its rigid discipline fosters the qualities of manhood and resolution, for there is no better method of imparting firmness of character than to teach unquestioning obedience ; its physical training gives an erect carriage and muscular strength that properly guarded are retained through many years, and its curriculum secures in large, but I do not think in full measure, the growth of the intellect in the right direction. I believe the time has come when certain changes and modifications are demanded in the mental course to bring it abreast with modern advancement.

I have always thought and still think that the method of teaching the natural sciences at West Point is too abstruse and fails to engender a proper appreciation of and love for them. In the law the student has his moot-court, in medicine his clinic, and in the various learned and scientific professions the inductive method of advancing from a part to the whole is used.

It does not seem to be a practical system that educates the bulk of its pupils for one special branch of the service and assigns them to another, and in reality it is not. An intelligent officer of infantry, a West Pointer who is now drawing his fourth fogy, recently declared to me that he was less fit to perform his military duties when he graduated from the Academy than he would have been had he never seen West Point, and that his experience leads him to prefer officers appointed from civil life. While I am not prepared to concede all that this implies, it certainly furnishes food for thought. Shakespeare's all-embracing genius seems not to have missed an estimate of the theoretical soldier. He makes Iago, an experienced campaigner and Othello's ensign, say of Cassio, who had been made lieutenant :

" And what was he ?

Forsooth, a great arithmetician,

• • • • •

That never set squadron in the field,

Nor the division of a battle knows

More than a spinster ; unless the bookish theorick,

Wherein the tog'd consuls can propose

As masterly as he ; mere prattle, without practice,

Is all his soldiership."

Such qualities in an officer it will be generally conceded are not all that are to be desired.

By cutting off some branches that have outlived their usefulness, reducing the theo-

retical instruction, increasing the practical and adding such as has been demonstrated by recent experience to be of value to the officer in times of peace as well as of war, it appears to me that the course would be improved and yield better results.

The daily experience of line officers on duty with troops shows the necessity of some sound instruction in physiology and military hygiene. Its introduction as a part of the course at West Point has been recommended by the last Board of Visitors and its acknowledged importance will doubtless lead sooner or later to its introduction, as the proper time to teach it is at West Point since it is fundamental.

Finally, I believe the minimum age for admission is too young. At 17 most youths are not prepared for the sudden sundering of home ties, and find the severe discipline and the mental work at West Point tax them to the utmost. Failure is probable and success if attained is apt to be only partial. They require some previous seasoning and as a very general rule need better educational equipment than they possess at that age. Indeed it is my belief that too much is left to West Point and not enough demanded of the candidate prior to his admission. Let him not enter before he is 18 or 19 years of age and then require of him the status which in effect he would hold had he been at the Academy one year. This would admit of the extension of the instruction comprehended by the subsequent three years course over a period of four years, render failure less liable, smooth many rough places and in the end give a better man to the service.

**Captain W. M. Black, U. S. Engineer Corps.**

"Education in a broad sense, with reference to man, comprehends all that disciplines and enlightens the understanding, corrects the temper, cultivates the tastes and forms the manners and habits; in a narrower sense it is the special course of training pursued as by parents or teachers, to secure any one or all of these ends." (Century Dictionary.)

Before examining the special work of the Military Academy it might be advisable to consider how many of the various aims, comprehended in the above definition, this special school is designed to fulfill. Certainly it is not true that the Government in founding and carrying on this school desires simply to provide a supply of educated men for officering its armies. That supply could be more cheaply obtained from the graduates of our many colleges and other institutions of learning. It is a class specially trained and specially instructed for a particular purpose that is required. In the past century this special instruction was given in all armies by attaching young men with the cadet, or a similar, rank to the various companies, and in the navies by sending boys out as midshipmen. The young men in these grades were under general instruction, while at the same time they performed certain duties suitable to their rank and years. This system was found to have many defects, chiefly perhaps resulting from the lack of uniformity and thoroughness of the instruction received, which necessarily depended upon the personality of the immediate commanding officers and upon the nature of the duties falling to the lot of the particular companies or ships. That the system was not wholly bad under favoring circumstances is seen to-day in the many splendid soldiers in our army and in civil life, who received their first training in this very manner during the Civil War.

To insure more certain results, our Government, following the lead of the French, for its own good, gathered the cadets serving with the troops into one school for this preliminary training. And right here let me protest against the saying so often heard in the halls of Congress and elsewhere, that the graduates of our Military and Naval Academies owe everything to the United States for the education they have received. Many of us owe little in that sense. Wishing to devote our lives to our chosen pro-

fession, we enlist in the service and receive our cadet or midshipman warrants, and in doing so place ourselves at the disposal of the Government, which, for its own ends, gives us the special training of the Academies. The obligation is mutual. As a result the Government is now obtaining the required service at rates cheaper than those paid by any corporation or body in civil life for like services from equally trained and responsible men.

It is then the second clause of the Century definition, the special course of training, that the Military Academy is required particularly to give.

This training for a soldier must first be directed to correcting the temper, in the broadest sense of this phrase, and to inculcating habits of integrity and of discipline of mind and body, including absolute devotion to duty. In addition, certain branches of knowledge must be taught, necessary for understanding completely and performing properly the duties which later are to be devolved on the young men. The enlightenment of the understanding must to a certain extent follow such a course, but general culture is not given by it, nor should it be expected from it. That must come from earlier or later studies.

That the work of the Military Academy has been eminently successful in fulfilling this aim, history shows. And I believe that not a little of this success is to be attributed to the system of teaching adopted there. "Tell me first what the text, which you were directed to learn, contains," says the Instructor. "Then give me any original method or improved process which you may have found."—Duty first, then originality or new matter. This system has been sneered at as cramping to the mind, but is it not carrying out the most important work of the school?

Bearing these facts in mind, it becomes difficult to criticise a course which has given such marked results in the past. The Military Academy methods are not, and should not be, similar to those of a university, where discipline is not a portion of the curriculum.

At the same time, too much may be sacrificed to this end. The course of the first two years, pure mathematics and French, are taught by the West Point method with little loss and much positive gain. If the suggestion of Lieut. Hubbard was adopted, of having exercises in French conversation from time to time, with the aid of Frenchmen, in addition to the present course of instruction, there would be a gain, without a loss of time, or a curtailment of the course. Perhaps the time now devoted to Spanish might be, partly at least, utilized in this way.

In the instruction of the third and fourth years the defects of the system become more apparent. In too many instances the courses are completed and with credit, by cadets who have little or no comprehension of the practical application of what has been taught. Engineering in particular, in which pure mathematics counts for so little and common sense and experience for so much, suffers by this system. To memorize facts and formulæ is of little or no use. Little is retained and needed time is wasted. This time could be spent better in the acquisition of a more extended general knowledge of the subject, with simply an understanding of the formulæ and methods, as they come up, omitting entirely the more elaborate discussions for the lower half of the class. All should have a comprehensive text-book which would serve as a manual for reference later, when needed, and all should have a better knowledge of methods, derived from familiarity with models of the various constructions and processes taught. To teach engineering properly and fully would entail more work on the instructors than does the present method, and the award of proper marks would require more judgment, but the results would be correspondingly better.

As soon as he enters the service, the young officer, frequently to his great surprise, finds that a large amount of professional reading is required to keep him abreast of the

times. Much drudgery and loss of time results to the conscientious officer until he has learned how to read—what to read carefully and what to skim—to get the gist out of an article in the shortest time and with the least labor. This is partly the result of a four years training during which he has received his mental provender in the most concentrated form, and during which he has been accustomed to “fly-speck” pretty much all of the text with which he has had to do. To this too may be attributed the distaste for books complained of immediately after graduation. This does not seem to be a necessary evil. Would not other methods of instruction in the applied sciences and the other advanced branches of the last two years in part at least remove this?

Lieut. Hubbard has touched on another evil in the course—overcrowding. My own personal experience (the professors of the last year branches have entirely changed since the by-gone days referred to, and possibly such things are not done now) was that, in the fourth year particularly, the lessons were assigned in each department seemingly without reference to the amount of work required in the others, so that the amount of study demanded in some cases was entirely disproportionate to the importance of the course as shown by the weight given to it in making up the final standing, and the total amount of study required to master the lessons of one day was more than the study hours allowed. Is this the case now? If so, should there not be more supervision on the part of the Academic Board of the work of the individual members?

Lieut. Hubbard's views of the importance and work of the post-graduate schools are sound. His recommendation that all officers should all be assigned for duty for two years with the line of the army, unless indeed he includes the Engineer Battalion in that category, is of questionable value, so far as the Engineers are concerned. The earlier proper assignments can be made, and technical training begins, the sooner is a man fitted for his special work. There is no limit to the amount of experience and knowledge which is needed in any profession, and two years is a long time to lose. In the case of the Engineers, should he intend to exclude the battalion from the line, it is hard to see what advantages can be gained from simple garrison duty anywhere, which cannot be gained equally well by service with the Battalion of Engineers.

#### **Captain J. S. Pettit, 1st U. S. Infantry.**

Lieutenant Hubbard's article on The Military Academy is quite interesting, but I fancy that officers who are thoroughly familiar with the details and aims of the Academy at present will not find much in it that is new nor any satisfactory solution of the difficulties which prevent its attaining still greater heights of glory and usefulness. Many of the criticisms put forth have been broached for years, but absolutely no progress has been made towards remedying the alleged defects, because no feasible plans have ever been suggested so far as I know, and Lieut. Hubbard does not aid us much in solving the mystery.

We agree that the course of study is crowded to the full capacity of good students and that but little time is given for digestion of subjects rapidly passed over, but in extenuation we may say that fewer men are found deficient now than fifteen years ago, and that the increase in the efficiency of methods of instruction must more than counterbalance the addition of new matter in that period. I do not believe cadets work any harder now than they did fifteen years ago. Mental digestion is not one of the prominent attributes of youth, and it is quite likely that much of the time allotted to digestion would be given to play. I think the tendency to make all studies highly mathematical has been overdone somewhat, and a little reduction all along the line would not injure either the interest or the usefulness of the curriculum. There would be nightly meetings of ghosts near Washington's valley for many nights.

The benefit of practical work within certain limits cannot be denied, and all wise

educators aim to obtain a just proportion between practical and theoretical work. I have had fair opportunities for investigating the work done in some of our best training schools and colleges, and I am led to believe that much of our alleged practical education is a sham and a delusion. Unless practical work is based on good sound theoretical training, and kept subordinate to it, it will take the bit in its teeth and run away with the system.

Some boys will devote enough time to reading a few verniers and adjusting a theodolite, for instance, to have acquired forty pages of the theory of surveying, and when they run across a different vernier and another theodolite, they have the same laborious process to go through again. There is no doubt but much good can be done in the departments of Natural Science by permitting a certain quantity of laboratory work, and I know that some members of the Academic Board have been considering it for years, and will undoubtedly adopt it as soon as the ways and means can be devised.

It is quite easy to make general criticisms, but the power to devise and master details is one indication of genius. Almost any man can build a great cathedral in his mind, and see it standing before him in all its beauty and strength. He might not be able to furnish the details or working models for even one window, or one arch.

We all admit that the country would derive greater benefits from West Point if our laws would admit a greater number of cadets, but it is not quite certain that any benefit would accrue to the Academy. Serious questions arise at once as to the effect the presence of a large number of cadets without hope of a commission at the end of the course would have on the discipline, morals, and standard of study, which are the towers of strength of the institution. Congress is not likely to provide for any considerable increase at present. I should like to see the experiment made of admitting each year 75 or 100 cadets, whose parents would be willing to pay the Government \$540 per year for their education, without a commission at the end of the course—the privilege to be apportioned among the states and territories in accordance with their population; the number from each state to be selected by competitive examination, candidates to pass the same entrance examination, physical, mental and moral required of Government appointees.

I think it is very desirable to bring West Point and our post graduate schools into harmony of purpose so the latter may begin purely military instruction where the former ends it, but I should hardly be willing to trust the future of our military school system to a commission to be appointed in an indefinite way. Educational institutions only become efficient after many years of laborious work by able men, thoroughly familiar with educational aims and methods, and no mere tyro should be given an opportunity to destroy or injure a great institution through ignorance or bad judgment.

I do not see any necessity for such a commission being permanent. Once in harmony, they could not stray widely apart for some years. He says, "Its appointment and the filling of vacancies from time to time are matters of detail." It is the "detail" in the method of appointment which would give strength or weakness to the commission. I should be radically opposed to giving *any commission* authority to "supervise the whole subject of military education in so far as it relates to officers and cadets." The system built up by Thayer, Mahan, Church, Bartlett, Kendrick, to say nothing of the interest and labor of our Professors now living, may have some weaknesses, but it is not to be lightly placed at the mercy of an arbitrary commission no matter how it may be appointed. So far as Willet's Point is concerned, but 3 or 4 men join each year, and it is hardly worth while to modify the West Point course for three or four men, who are to do purely technical work for years.

As for Fort Monroe, officers should be sent there before they have forgotten all they learned at West Point. Leavenworth is not purely a post-graduate school, for



many officers sent there have not passed through the Military Academy and the course of instruction must be adapted to meet their needs.

There is not enough military science taught at West Point in the four years to place it in conflict with any of the post-graduate schools in that respect, and so far as natural sciences, mathematics, languages, etc., are concerned, strong foundations have been laid upon which great superstructures can be built, at Fort Monroe and elsewhere, if you get the right sort of builders. I don't see that West Point has any quarrel with the others, or that it is necessary to seriously modify it, to make them efficient and harmonious.

Spanish and the Drill Regulations might be omitted from the course without much injury. I would also omit say one or two mathematical recitations per week and introduce German. A reading knowledge of French and German is of enormous advantage to officers, and, of the two, German is most important for it is the richest language in military literature in the world. A *speaking* knowledge of French and German is of course a nice accomplishment, but I should not allow an *effort* to acquire such knowledge to interfere with the reading. German is difficult, but our University students seem to acquire some knowledge of it in a comparatively short time. But few of the fine German military works are translated, and their vast storehouse of military information is practically sealed to us. Spanish is of no use from any point of view. "There is now no adequate means by which the views and opinions of graduates can be reflected in the West Point course." Fortunate thing. If the "commission" had to listen to and act upon the views and opinions of graduates, it would be in a more serious muddle than the House Military Committee with a "reorganization" bill on hand. There are nearly 60 graduates on duty at the Academy and about one-fourth are relieved each year. A majority belong to the line. I never knew any of them to be diffident in expressing his opinion relative to the management of the Academy and I never know any member of the Academic Board to decline to listen attentively to any earnest expression of opinion. Most of the opinions are given in generalities and some insuperable obstacle is met in the effort to supply the necessary details.

"The methods of relief" proposed are the usual ones, and most of them depend upon Congressional action which is scarcely to be hoped for at present. We admit their good points but must mark them out as impracticable.

There is no doubt but the so-called instruction in quartermasters' and other papers is worse than useless, and I have always been of the opinion that the hours spent at "heavy manoeuvres" in Fort Clinton were worse than wasted because they could be devoted to so many better things. If there is anything in the Course which ought to be transferred to Fort Monroe it is certainly these "heavy manoeuvres." I mention these two details of instruction as examples of changes which are well within the control of the Academic Board, and are almost always the first things selected for criticism by graduates, because they are so palpably weak and useless. The one department in need of *radical* change, and which can be effected without outside assistance, is the Department of Tactics and Discipline. I have not space to go into details, I supplied them a few years ago in a paper.

West Point is the *base* of our system. It is very strong; it may need re-pointing, but it is still firm and not a stone should be moved. It will support any monument its graduates may choose to erect upon it. It is unique in this, that it receives more abuse and injury from its own graduates than any other educational institution in our land, and more praise and admiration from sister schools.

I think we will all agree that a "war school" would be an excellent thing. We don't understand how it is to be organized or controlled, or what it is to teach, or who it is to teach, but it is a good thing *per se*, and let us have it right away. It would be



crude at first, but it might develop into a grand institution, we should be able to predict either the success or failure after it had been in operation five years, and it is worth trying.

So far as methods of education are concerned, it is probable that some of ours are old and need revision, but a school is best judged by *results*, instead of by methods, and from that standpoint West Point is easily superior to any school in the land. If it can be demonstrated to the satisfaction of the Academic Board that new methods are going to increase the usefulness of any department, I know they would not hesitate a moment to recommend the change. In education we "must make haste slowly." We have made great progress in the last ten years in military education. The Leavenworth school has passed through the crude and uncertain period, and is doing good work with steady improvement. If the Artillery School is not satisfactory we are inclined to think that it is the fault of the officers of that arm of the service.

**First Lieut. W. E. Birkhimer, Adjutant 3d U. S. Artillery.**

Lieutenant Hubbard has given us an instructive and philosophical paper on the subject-matter of his essay. The topic is important, and has been ably handled.

The essayist indulges particularly in criticisms of various features of the West Point course of instruction: if well founded, they should be heeded; if not, that fact should be made clear. The institution criticised is venerable in years and honors. The wisdom of that far-reaching policy which established it has been vindicated in the minds of the American people. The service of its graduates, both in military and civil life, has given lustre to the country's history. "Let well enough alone" is a wise maxim, which might well prompt to caution in commenting adversely on an institution which has wrought such results. Nevertheless, if improvements may be brought about there, by all means let them be; but it by no means follows that every change suggested will if adopted prove to be an improvement.

It is doubtful if the army appreciates what it owes to West Point. It owes everything for raising it from nothingness in public estimation to distinction; *esprit*, character, and all things worthy of respect. Indirectly the non-graduates are as much indebted to the Academy as the graduates are directly. To that Institution is due the fact that, after many years of blind hostility extending over the earlier decades of this century, the army at length attained to a position of honor in this country. In this the non-graduate as well as the graduate and every enlisted man in the army is interested. This may not be self-evident, but is capable of demonstration.

By accident rather than design, the Military Academy was established soon after Mr. Jefferson became President. But, until it met and frustrated Burr's conspiracy, thus saving the reputation of his administration, he never gave the army a generous thought, nor spoke a kind word for it. From the beginning of Jefferson's administration down to the War of 1812, the army was treated with every contumely, and well-nigh sank, professionally, under the studied neglect of the party in power. The officers and men were brave enough; but, as a result of this ill treatment, technical knowledge was limited, and the habits of the army, judged by present standards, were bad. As years rolled by this condition of things was gradually bettered. Such changes are always slow: with us at that time particularly so. Our people were non military in habits, pursuits, sympathies. But after the Academy began to work its effects the fact slowly dawned upon the public mind that officers of the army generally were men of capable parts as well as liberal education, while they ever were acknowledged to be brave guardians of the national honor. In creating this revolution of sentiment in the community the engineers acted a preëminent part: this more particularly through the planning and construction of internal improvements which conserved the pecuniary inter-

ests of the people. While doing this the foundation for political influence began to be laid, and through this again the favor of the national legislature was obtained. This latter again was greatly increased and finally made permanent by a stroke of genius in permitting members of Congress to nominate the West Point cadets.

The education acquired by, and the military character developed in, the graduates of the Academy began more and more to infuse a respect for the Institution throughout the country. Its graduates generally were, it is true, occupying subordinate positions; but that was not to their discredit, and in those positions they everywhere met and surpassed public expectation. The character of the army, the esteem in which it was held, and the recognition it received rose directly in proportion to the character and attainments of its officers. This must ever be so in all armies. The first outward manifestation of this change in public sentiment towards the army was contained in Chapter 162, Act approved July 5, 1838, increasing it. Considering all the circumstances, the passage of this act was remarkable. It was valuable to the army not so much on account of the material and professional comforts it brought, great and needed as these were, but as indicating that the army itself had emerged from that obscurity to which national prejudice, fomented by political demagogism, had been inclined to consign it; and had become, through the friends it had made and the respect, even affection, it had inspired, a recognized power in the State. It has never taken a backward step. What had brought about this change? Nothing but the character and attainments of the Military Academy graduates. These had forced recognition from a doubting public, but it was a recognition which though slowly yet was profoundly and permanently laid in the public mind. Assaults continued to be made by individual members of Congress, and by State legislatures, in isolated instances, upon the Military Academy, but without avail except to keep its friends both inside and outside of the army rallied to its support.

Another consideration: it was observed that officers served uncomplainingly on the Indian or other frontiers, braving danger, and by their sacrifices rendering secure the firesides and business of the hardy pioneers. For years they traversed the sickly swamps of Florida, opposed by an invisible mixed Indian and negro foe, and yet more deadly fevers. The same story of devotion to duty illustrated their service at all times and in all places. In time this fact became well understood; and it was seen by the people that the youths educated at the national military school, were not only gentlemen but brave men. All this had an influence in establishing the army in the good opinion of the country. The process was gradual; the steps in advance almost imperceptible; but the march was unswerving, and led straight up to the confidence of the people, which the army has never disappointed.

The Mexican War added greatly to the prestige of the army, and even more of the Military Academy. Again, it is true, its *élèves* served in subordinate capacities, but the manner in which they did it, and their bravery on the battle-field, was at once the pride of the people and the glory of the nation. To have attempted after that war to decry in this country the value of the army as the great conservator of military discipline, experience and knowledge would have been useless. Congress, all authorities, the people themselves, knew otherwise. And while political generals in many cases then held high commands, they never hesitated to call around them, as assistants and mentors, officers of the regular army, particularly graduates of the Military Academy. Strange to say, too, these political generals were magnanimous enough to acknowledge these obligations. Another circumstance in the conduct of the Mexican War deserves notice in this connection, namely, that so well did the regular army approve itself to executive favor, that the President recommended increasing it rather than depending on volunteers. This was done to the extent of ten new regiments by Chapt. 8, Act

approved February 11, 1847; and, next session, the Senate passed a bill for adding ten more, which failed to pass the House because of the ending of the war. Although this particular increase of the military establishment was but temporary, the regular army, as mentioned, came out of the war with greatly increased reputation. This it has since not only maintained but augmented. Particularly was this the case between the Mexican and the Civil War. Perhaps no better indication of this feeling of confidence could be cited than the placing army officers in charge of the construction of public buildings, such as the National Capitol, post-offices, etc., during this interval. These duties were purely civil: opposition to this course was strenuous; some of the purest patriots and best friends of the army even in Congress took alarm, and raised what they supposed was a warning voice against the growing partiality for having army officers in charge of public works, indicating, as it certainly did, greatly increased confidence in the integrity and ability of this class of public servants. It was feared that the military would rise superior to the civil power in the country. Idle fears! These officers had sprung from the loins of the people, were part and parcel of the people themselves, without ambition except to secure the interests of the people. But what a contrast the regular army of 1860 here presented with its predecessor in the days of the timorous Jefferson! The change was due to one cause, the confidence inspired in all classes by the talented, accomplished, and practically useful officers educated at the Military Academy.

In 1860 the character of the regular army, as it has remained since, had been developed and taken permanent form. The War of the Rebellion amply justified the confidence in graduates of the Military Academy which many years of experience had inspired. Out of that gigantic struggle in which armies were raised and material handled dwarfing in magnitude anything that preceded in authentic history, they alone demonstrated their ability to meet successfully the military necessities of the nation. On the side of the Union the only officers who rose to the rank of general, which even Washington had not held under the Constitution,—Grant, Sherman, Sheridan,—were trained within the walls of the Academy, and it is believed that the same was true on the side of the rebels. Thus had this honored institution both in peace and war, stood the supreme test, that of imparting practical efficiency.

For years before the War of the Rebellion graduates of the Military Academy had greatly predominated as to numbers in the commissioned ranks of the army; after the Rebellion and down to this time, the other element was and is most numerous. But, notwithstanding the number of officers appointed from other sources during and immediately subsequent to the War of the Rebellion far exceeded those who had graduated at West Point, the former came into an institution whose character was fixed, whose traditions were established, and whose rules of service, based on many years experience, they could only accept, without power to change. They entered the army to adorn it, but the army absorbed them, not they the army. This is not said to their detriment. Far from it. These officers appointed from the volunteers, the army and civil life were a noble band of patriots. When danger menaced their country they flew to its defense, did valiant service, and now dedicate themselves to the maintenance of its integrity. To state this is only to bestow their just meed of praise and is done with great pleasure. Yet their coming into the army had little positive effect except to increase its numbers. They accepted, perforce, the army as they found it. The army, on the other hand, took them in without the least derangement of its appointed and well established system. They partook of the standing of the army before the nation; that standing, as has been shown, was due to the influence of the Military Academy, the advantages of which they thus indirectly have received the benefits of. On the other hand, also, they since have exerted an influence on the army, which, regulated

by the established customs and traditions of service, has been at once liberal and beneficial. This, also, we acknowledge with pleasure, as we extend to these gentlemen, our brethren, the right-hand of professional good fellowship.

It is the course of instruction at this Military Academy, which has made the army what it is, and whose graduates have signalized the virtues and glories of the Republic in all the elevated walks of life within its borders, and before the world, that is the subject of the essayist's strictures. These are given with candor, evidently after much thought, and are worthy of reply in the same spirit.

The essayist has but recently been an instructor at that institution in the department of chemistry, etc. It is not surprising, therefore, that he leans towards the inductive rather than the deductive method of instruction. What he says about mathematics being given prominence at West Point is true; it also is true that, in such institutions, some mathematical fools might graduate lamentably high; but this fact by no means furnishes an argument against the mathematical system. These persons are fools by nature, and the mathematical course does not make them such. So far as it was possible of attainment by human agencies, the West Point course, by opening such naturally narrow minds to other things, tends to broaden them.

But, leaving aside particular cases, from which we may not logically deduce general principles, it is not believed that the proposition is established that at West Point "the value of mathematics as a mental training, has been over-estimated." The essay itself is a refutation of the proposition. It furnishes no evidence of a mathematically contracted mind. Now, in this world, there is nothing more valuable than constancy and steadfastness of purpose. The mathematical training is calculated to develop this important attribute. How? That there be constancy of purpose it is necessary that the mind have a foundation to rest upon, certain, unchangeable, like the earth beneath our feet. Mathematics furnishes this. Its processes are those of an exact logic. When the mind has once thoroughly mastered a demonstration, the premises and the conclusions, it has something tangible, real, substantial to rest upon, and may use this as a point of departure whence to proceed to other demonstrations, and establish for itself other certain points of rest. This process, sufficiently continued, systematically, intelligently and scientifically pursued, furnishes in time a broad foundation for the working of the mind while pursuing all investigations incident to the affairs of life, either in the army or out of it. This foundation is not only broad, but deep laid and certain. Resting upon it the investigator, whatever his field of research, may march boldly forth feeling certain as to the soundness of the ground work upon which his superstructure rests.

West Point does not educate anybody. That is impossible in four years at any liberal institution. What, from an educational standpoint, it does, and successfully, is to give the cadet the basis of an education. It depends upon the man whether, by keeping up his studies, or by using these as an origin, he shall branch out and become really educated either in the old or in new fields of investigation. Moreover, suppose he do not cram himself with mere book learning, but, as a practical man of affairs, uses his school knowledge to forge his way, against competition, in the business world. Is he not equally a good citizen? If we except instructors, professors, and others whose business in life it is to teach youth, the man who has nothing but book learning is only half educated for the purposes of life, no matter how much of it he has absorbed. To be worth anything, he must add practice to precept.

The essayist recognizes this fact. He proposes to give this practice at the Academy to an extent not now done. But this will take time from something else; and, as the course is now crowded to the limit of the cadet's capacity, it is plainly imprac-

ticable to get this practice except by omitting some portions of the present course of instruction. Spanish and drill regulations are mentioned as those, for instance, that might be sacrificed with advantage, to gain time for laboratory and other kindred work. But are not these just as important as laboratory work in some selected department? Spanish was placed in the course after the Mexican War because of its practical utility; and it seems eminently fitting that graduates of our National Military Academy should at least know, by attentive study of the subject, how to manoeuvre troops and array them in order of battle. It has been made a reproach to West Point that all except military information is imparted there. This, facetiously by some, maliciously by others, ignorantly by all who make it; nevertheless, the proposition to omit instruction in drill regulations would, if practically carried out, give a handle to those persons to claim that their assertions are based on truth. On the contrary, so far from taking time from the soldierly work to devote it to that of the laboratory, it is believed that the former could with great benefit be moderately increased at the expense of so-called scientific studies. It is difficult to tell what it is that makes a disciplined soldier out of the crude boys sent to West Point; but whatever it is, it is the pearl beyond price of the institution. It is, perhaps the life and studies, taken altogether, acting and reacting the one upon the other, that produces that intangible something without which the soldier is mere clay, and which, directly in the proportion to which it is present he is valuable as a soldier—discipline. By discipline we mean that loyal spirit which enables the soldier to say to his superior in good faith, "Not my will, but thine be done," and prompts him sacredly to speak the truth, cheerfully and faithfully to obey orders. This does not require any laboratory work, but it is worth more to the army than all other acquirements attained at West Point put together. Now, laboratory work will not, probably, impede this salutary and all-important work of disciplining the cadets; but, if their minds are wholly to be diverted from the military studies proper, like drill regulations, in order that the recendite studies may be more thoroughly pursued, they may, it is true, graduate more learned men in the popular acceptation, but they will be less learned as soldiers—the aim and object of their being.

The essayist believes that the West Point course fails to teach its pupils how to learn in future, to work intelligently on any given line, or to instill habits of judicious reading. This is a sweeping criticism. It lies close to the domain of glittering generalities. That it should have been made will surprise most people acquainted with the facts. Every hour's experience in army life shows that the education acquired at West Point in a preëminent degree fits him, who has the disposition, to rise in every branch of human learning, military or otherwise, to which he may be willing to devote his time and attention. If he do not rise, and increase in knowledge, therefore, the trouble is with the individual and not with the foundation of an education given at West Point. Again, it by no means follows that because an officer is not a book-worm that he is not an excellent officer. The military profession is not a sedentary one; its successful devotees are not recluses, shutting themselves up in closets to pore over books; it is an eminently practical profession in which the study of the man, soldier, his nature, habits, and management is intricate and of first importance. This knowledge, without which the officer is a mere theorist, cannot, except very imperfectly, be learned from books, but only in contact with soldiers, taking care of, and in command of them. We are inclined, therefore, to attach less importance than the essayist apparently does to the assiduous pursuit of special book-studies after graduation, and much more to the study of human nature and human wants as found in the personnel of the army. For what is necessary in the way of special studies, the education acquired at West Point, experience has proved, forms an admirable ground work.

The essayist sees in the circumstance that two commissions were brought into

existence in 1860 to examine into, among other things, the Academy curriculum, evidence that it was faulty and needed revision. The conclusion does not follow from the premises. How did it happen that these commissions were appointed? When Jefferson Davis was Secretary of War he increased the course of study to five years. Between him, as senator, and his puny successor as Secretary of War there existed a bitter antagonism. It was the latter's ambition, apparently, to undo everything Mr. Davis, who loved the Academy and the army, had done in the War Office affecting either. Hence the issuing of that only partially executed order of 1858 to return to the four years' course, the operation of which order was suspended. But Mr. Davis was a powerful senator, set in his purposes, and not to be trifled with. And, although in lengthening the course to five years the consensus of opinion of competent judges was that he had made a grave mistake, it was deemed best, if the four years' course was to be resumed, to do it in a manner least offensive to Mr. Davis, who now was up in arms and making a personal matter of it. Under these circumstances the War Department appointed a commission to examine carefully into the whole subject. About the same time the matter came up in Congress, where the Houses divided in opinion, one favoring inserting into the Academy appropriation-bill a clause compelling a restoration of the four years' course, to which the other refused assent. As a compromise, the commission of which Mr. Davis became president was provided for, with the result mentioned by the essayist. These details are here given because, with two commissions appointed in quick succession in this way, the inference drawn by the essayist was natural that something was radically wrong in the West Point course: whereas, that question was not involved at all, but whether or not it was best to spread it over five years.

In criticising the course in French the essayist was doubtless prompted by an amiable and accomplished adviser. We question not the value, in the abstract, of the suggestions made; yet are entirely willing to leave the subject in the hands of the present experienced professor and his able assistants, convinced not only that they are competent to the task imposed upon them, but that even the essayist himself, were he brought officially to view the matter from the stand-point of responsibility attached to the head of that department, would admit that good and sufficient reasons exist for the present order of things.

The essayist argues that the West Point course is over-crowded. In this we incline to think he is entirely correct. In this matter we are not "left to roam in the trackless fields of our imaginations." The subject assumes a concrete, well-defined aspect. In 1860 Professor Bartlett (the mention of whose name causes every graduate to uncover in profound respect for his memory) said that the course was too full for the time; in 1865, Colonel Thayer, the "Father of the Academy," said that, in consequence, the pupil was overtaxed and "crammed"; ye, as the essayist shows, from 1878 to 1893 the total for general merit was increased 20 per cent., which seems to mean that the course—what cadets are required to learn—had, in this interval, been augmented that much. We also are permitted to take judicial notice, as it were, of this subject; those who have been through the course and have been instructors there are competent to speak from experience. Doing so, we have no hesitation in inclining strongly to the view of the essayist. When instructors whose business it is to confine themselves to one subject, the lesson of the day, repeated year after year, find that it takes all their time, working early and late, to prepare themselves for the day's work, the only wonder is that the cadets do so well. The great trouble is, that they have not time to assimilate the knowledge thus acquired, to digest it, make it part of themselves. The lesson done, they spring with alacrity to the next lesson without having a reasonable time to reflect upon what they had learned in the last. Now it is impossible wholly to obviate this difficulty. The cadets have varying learning capacities.



The interval in this regard between the first and the last man is immense. A course which tests the former to his limit is beyond the latter: if within the grasp of the latter, it is too limited for the abilities of the former. But at West Point, ostensibly at least, all pursue the same course. In fact, they do not: the difference arising in omitting part of the text covered by the upper sections in favor of the lower section-men. It is but natural that a sentiment should be generated in the Academy prompting to the reducing this omitted part to the smallest practicable limits. All is useful: all is important. The educator, therefore, sees with reluctance those under his charge deprived of any part. The inevitable tendency is to "cram" in preference to omitting: the educator is all unconscious that this is so, but the effect as regards the lower section-men is none the less deleterious. We remember a few years since hearing a general officer who had officially examined into the subject of the Academic course say that of all the sights he had ever witnessed, the devoted struggles of the noble youths at West Point in attempting to master their course of instruction was the saddest. This subject deserves the careful attention of the Academic Board. The army gives them credit for their faithful and unselfish labors. Nevertheless, their horizon is a contracted one: that of the the army, and particularly of the hundreds of graduates scattered in all the walks of life is much broader. Moreover the latter, equally with members of the Academic Board, are interested in maintaining the high standing and honor of their beloved Alma Mater. This cannot be done by adopting a course of instruction which renders pupils superficial from the impossibility of their mastering it. Now if it be true, as we believe it to be, that graduates away from West Point are of almost unanimous opinion that the course of instruction is too crowded for the time allowed, the circumstance is worthy of candid and careful consideration.

The essayist, in the spirit of the true reformer, does not content himself with pointing out faults, but suggests various plans of amelioration. We pass at once to the last, deeming the others either unwise to attempt in this country or at best of doubtful wisdom. The last proposition is to revise the West Point course, bringing it into unison with those of post graduate schools now established for all arms of service and also the engineers. It is believed, if this were done, certain studies at the Academy might either be omitted or time devoted to them be much abridged. At all events, duplicating studies might almost wholly be obviated. The essayist suggests that a permanent commission should be entrusted with the harmonizing all these courses of instruction. The suggestion is a practicable one; nor is it seen what other plan, considering the duty to be performed and all the difficulties attending the situation, would be so advisable.

We are not deceived as to the character of these post graduate schools. The course of instruction for each must be arranged for all the pupils who present themselves in obedience to orders. The abilities of the pupils vary greatly. Each course of instruction must take cognizance of that fact. Again, the post graduate schools have no legal recognition outside of the small appropriations for books annually given them. They are creatures of executive orders. The result of all this is that, in appointments and equipments, outside of the practical course, and considered merely as schools, they are small and insignificant affairs compared to West Point. The instructors are officers on the same plane as the instructed. The result is this: at the post graduate schools officers are given opportunities to acquire professional knowledge, and if disposed to take advantage of them, such schools may be immensely useful: but it is done by the officers helping themselves to knowledge, by taking advantage of these opportunities, and not through any rigid course of instruction under professors of great and acknowledged ability. But this is not necessarily a disadvantage to the student-officers. It has the effect to throw them on their own resources; the instructors are there to hear them tell how much they know, not to lead and direct their minds. This, according to the essayist, was formerly much more the practice at West Point than now, producing



better educated men, men of more power. However this may have been, and as to this no doubt opinions differ, there can be no doubt but that the existing post-graduate schools afford all student officers, no matter what their antecedents, excellent facilities for acquiring much practically useful information. They are excellent institutions, conceived in the right spirit, demanded by the best interests of the service, are now upon a good footing, and they deserve, as it is hoped they will receive, the fostering care of government. To the faithful, conscientious and zealous officer these schools present a fit opening for building a substantial professional superstructure upon the foundation deep-laid at West Point. He here has facilities for supplementing by a practical course the theoretical one there mastered. The combination makes the well equipped officer. The suggestion of the essayist that two years should intervene between the West Point and the post-graduate course certainly is correct. The right kind of an officer could put in twice that interval with advantage to himself. In this manner he would learn something of the army, of the life of the officer otherwise than as a student, and would return to scholastic duties with a mind broadened by observation and stored with knowledge acquired otherwise than from books studied at dictation and under compulsion.

The possible efficacy of post-graduate schools being thus demonstrated, it certainly will be the part of wisdom to arrange their courses of instruction and that at West Point so that the student, without unnecessarily duplicating anywhere, will be able to master each as in turn it is presented. It is not seen that any obstacle interposes to prevent this being done; on the other hand, the advantages of such a plan are great and manifest. As the essayist suggests, this could most satisfactorily be accomplished under the supervision of a commission acting under the orders of the War Department.

Supplementing the post graduate courses, the essayist suggests a war college where the duties of the staff, the combined use of the three arms, military history, campaigns and strategy could be studied. We are aware that such institutions exist abroad. Their importance in countries where they are maintained is conceded. Such an institution with us could only be useful to a comparatively limited degree. Abroad, distinction at war schools is rewarded by official preferment. Under existing laws it would not be so in the United States army. It is the hard lot of the officer that, after he leaves West Point, neither ability, nor attainments, nor service, not even action on the field of battle avails anything as against political influence. The most brilliant talents for staff duty, made evident at the war college, if unbacked by that potent influence, would be relegated only to obscurity, while the dullard at the foot of the class, basking in the sunshine of political favor, carries off the prize that should be the reward only of ability, diligence, and military virtues, and which abroad distributed on this principle alone makes their war colleges a success. In our service it is believed that expectations based upon the results attained at war colleges in foreign military nations would be grievously disappointed.

#### **First Lieut. Albert Todd, 1st U. S. Artillery.**

Lieut. Hubbard's article certainly deserves the careful consideration of every friend of the Military Academy. The subject has evidently been thoroughly studied, and, as Lieut. Hubbard has lately completed a tour of duty at the Academy, he cannot be charged with not knowing whereof he speaks. That some changes are needed at West Point will hardly be denied by any one, but agreement upon just what are necessary cannot be easily attained. There is a tradition that one of the professors of the old régime (those men who gave the Academy its great renown in the general period 1830-1880) said that he thanked God that there had been no changes at West Point in fifty years. The story is probably apocryphal, but there is no denying the fact that the Academy is unduly conservative.

It has been a good military school and still is. No more faithful body of professors than those who have directed its policy, ever graced the catalogue of any institution. But it is believed that every good feature of the Academy can be preserved, and at the same time such changes introduced as will materially increase its effectiveness as the training-school of our military establishment.

Without attempting to comment upon the whole of Lieut. Hubbard's paper, the present writer desires to consider the course of study, and, as intimately connected therewith, what are now known as the post-graduate schools. And as a preliminary to what shall be said, the fact must be distinctly set forth that West Point is *not a charitable institution*.

The Government does not spend hundreds of thousands of dollars annually to educate young men because these young men want a free education.

It trains them as soldiers because it wants men ready when the war dogs are let loose. Therefore it is not believed that the course of study should be so adapted that the Academy will necessarily be open to all.

The Government has a perfect right to demand that the cadet shall have a certain amount of education when he reports at the Academy, and this amount may well be made greater than it now is, without opening the way for any proper criticism on the score of exclusiveness. The writer believes that a large portion of the present first year's course should be pursued before the cadet reports. Why should not the candidate for military glory have, at admission, a knowledge of mathematics to include at least trigonometry—a fair acquaintance with French—and a thorough knowledge of English grammar and rhetoric, all in addition to what is now required? Then again, as Lieut. Hubbard has well said, too much has been crowded into the course all the way through, and especially has mathematics been given an excessive share of attention. The writer has had probably the average experience of graduates, and he has had so little use for the higher mathematics, or at any rate for their use as applied in the studies of the last two years of the course, that he is justified in saying that much time is wasted in mathematical gymnastics, when other more useful studies would give equal mental training. Lieut. Hubbard's suggestion that Spanish and the book study of Drill Regulations should be dropped is sound. Now let us suppose the course pruned as suggested and the training in the physical sciences to be more in the way of laboratory work. Far from lengthening the course at West Point, it could be shortened to three years.

Then the fourth year could be put in at what are now known as the post-graduate schools. At the end of the third year let the cadets be provisionally graduated and assigned to the army as brevet second lieutenants in the various arms, and at once, or at most after a month's leave of absence, sent to the special school for the arm. Let the year there be devoted to real school work, the new graduates to do no duty with troops except as a matter of instruction to themselves. At the end of the year let them be finally graduated, and arranged in their several arms according to class standing as determined by this last year's work, combined with the work at the Academy. There should of course be a War College where certain men from all branches of the service should be sent for still higher training, but the work there need not necessarily follow immediately upon the four years' course, indeed it would be better to let a few years of service with troops intervene.

There are some matters of detail in connection with this plan which would require careful working out. No attempt is here made to more than suggest the general idea, but it is believed we would have officers better prepared for their duties by some scheme like this, and it is hoped that the near future may bring the needed changes in our methods of military training.

## Reprints and Translations.

### THE TACTICAL AND STRATEGICAL POWER OF MOUNTED TROOPS IN WAR.\*

BY MAJOR-GENERAL E. T. H. HUTTON, C. B., A. D. C. TO THE QUEEN,  
COMMANDING THE NEW SOUTH WALES MILITARY FORCES.

THE importance of mounted troops in war has been a somewhat varying quantity. In very ancient times the power of mounted troops, governed, as it necessarily was, by the primitive arms of the men and imperfect equipment of the horses, was comparatively small. In the Middle Ages, however, the armor of the knights and the improved equipment of the horses made the chivalry of Europe an overwhelming factor in battle. Gradually, however, an improvement in the weapons of the infantry took place, and an increase in their relative power followed. Thus, in the battles of Frederick the Great the cavalry bore a proportion of one-fourth, and even one-third, to that of the whole armies engaged. Later, in the Napoleonic wars, when the improvement of infantry fire-arms and the introduction of the bayonet increased the effectiveness of infantry, the cavalry bore a proportion of one-eighth and one-tenth to that of the whole force. This proportion has been maintained until the present day, and, developed beyond all former precedent as infantry fire power has been in the last few years, the acknowledged proportion of cavalry to the other arms has still remain unchanged. There has even arisen a school of distinguished men, among whom may be included the present German Emperor, who affirm that, in spite of the rapidity and low trajectory of modern infantry rifle fire, the power of cavalry in the field of battle remains as great as, and even greater than, in the early days of the present century. It is incontestable that the power of mounted troops in recent wars has proved itself of as great, and even greater, effect than ever before—though perhaps in a form less attractive, less understood, than when—

Ascending squadrons come.

Yet more! yet more!—how far array'd  
They file from out the hawthorn shade,  
And sweep so gallant by:  
With all their banners bravely spread,  
And all their armor flashing high.

—*Marmion*.

\* This paper was read before the New South Wales United Service Institution, Sydney, August 28th, 1894.

Certain portions relating exclusively to Australian conditions have been omitted.

## THE TACTICAL POWER OF MOUNTED TROOPS.

When the great area over which modern battles must extend, the vast range of fire, the accuracy and deadly nature of modern fire power, are considered, it follows that rapidity of movement and the power of covering distances at a rapid pace by the advanced bodies of troops becomes a necessity. Of what avail will slow-moving infantry scouts be when opposed to a long range and powerful artillery? What commander will dare to develop an attack against an enemy whose presence at three miles distance, unmarked by smoke and unannounced by "cannon's deadly roar," is only revealed by the shower of bullets fired at long range, and by well-directed shrapnel fire? It will obviously be necessary to push forward mounted men, who, by their rapid manoeuvres and far-reaching flank movements, can give intelligence and compel the enemy to display his strength and make evident his position. The preliminaries, therefore, of every battle, of every skirmish, must be left to mounted troops. It should be always borne in mind that, in modern battles, infantry once committed to an attack cannot be withdrawn except by undue loss of life, and loss of some initial energy, and even of *morale*. Thus, therefore, for the primary duties of reconnoitring, scouting, and covering an advance, for which all mounted troops exist, or have existed in past and recent times, their value is now even more evident than it ever was before. It is also a curious fact that a modern military school of thought ascribes more tactical importance than ever before to its effect upon infantry and upon artillery when shattered or shaken by the deadly character of modern fire, or when taken by surprise. It is argued, and I think with reason, that in modern battle the effect of a superior infantry or artillery fire will be so great and so demoralizing that the victims will become an easy prey to an impetuous, well-timed, charge of well-led cavalry. Personally I am inclined to this view, and so also are many, who, like myself, have taken part in recent wars in Africa and in Asia with savage tribes—tribes who, emboldened by fanaticism or a wild natural courage, have advanced in spite of shot and shell, and have reached, ay! and have even broken British squares. This has been well commemorated in homely soldier's language by Rudyard Kipling:—

So 'ere's to you, Fuzzy-Wuzzy, at your 'ome in the  
Soudan;  
You're a pore benighted 'eathen, but a first-class  
fighting man;  
And 'ere's to you, Fuzzy-Wuzzy, with your 'aytick  
'ead of 'air;  
You big, black boundin' beggar—for you broke a  
British square.

Yet the moral effect of a charge of natives, no matter how brave, is small indeed compared to the stern thunder and reality of a compact, well-led charge of cavalry, preceded, as it would, be, by a covering fire of artillery.

The importance, then, of mounted troops upon a modern field of battle may be accepted, and I will, with your indulgence, proceed to show how cavalry tactics may be modernized and simplified, so that, while satisfying the existing conditions of war, they may be easily applied, and may be with

facility learnt by British troops from whatever branch of our race they may come.

The important elements of success must be—

(a) Simplicity.

(b) Rapidity.

(c) Conformity to modern conditions of opposing fire power.

To gain these ends the cavalry formation in double rank must, in the writer's opinion, be at once abandoned.

The last edition of British "Cavalry Drill," Part III., with an instinct of emancipation from old tradition, indicates that "movements should occasionally be practised in single rank, not only because that formation may often have to be employed on service, but also, etc."—Cavalry Drill, 1891, page 303. The paragraph is undoubtedly the precursor of the next great change in our cavalry tactics; but as it took nearly twenty-five years of controversy to adopt, at last, that primary condition of administrative efficiency—the "squadron system,"—so possibly it may take another ten years to similarly adopt the single-rank formation.

It is the double rank which complicates and breaks the temper and the patience of every learner of cavalry drill. It is the double rank which necessitates half the complicated manœuvres in the drill-book—movements which none but regular cavalry, trained men on trained horses, can ever hope to master with effect. It is the cavalry system of double rank which necessitates the continuance of those old-fashioned movements long abandoned by the infantry for maintaining the relative position of the front and rear ranks.

"Cavalry," wrote the Duke of Wellington, in 1833, "is essentially an offensive arm whose use depends upon its activity, combined with its steadiness and good order. I think that the second rank of cavalry at the usual distance of close order does not increase the activity of the cavalry. The rear rank of the cavalry does not strengthen the front rank, as the centre and rear ranks do the front rank of the infantry. The rear rank of the cavalry can augment the activity, or even the means of attack of the front rank, only by a movement of disorder. \* \* \* \* The second rank at a distance sufficiently great to avoid being involved in the confusion of the attack of the front rank, whether successful or otherwise, could aid in the attack, or, if necessary, cover the retreat of the attacking party, and thus augment the steadiness and good order of the cavalry as a body; while by the absence of all impediments from the closeness of the rear rank the activity of the front rank would be increased. \* \* \* \* The one-rank system \* \* \* would render the use of cavalry in an army much more general than it is at present."

"As to the rank entire system," wrote General Sir Hussey Vivian, of Waterloo fame, who afterwards became Lord Vivian, "I am by no means certain that it would not always be a good thing if, on advancing to an attack, or standing in line, the rear ranks were to form a reserve at a distance. \* \* \* The fact is, the second rank is of but little use but to fall over the first."

Lord Anglesea shared the same views. In 1835 Gen. Bacon of Peninsula

renown, who afterwards commanded the Portuguese cavalry, thus writes :—  
 “In one rank all movements are made with greater precision and more regularity than in two. When cavalry has to reform after a charge it is effected more readily and far quicker. \* \* \* I have tried this in the presence of a superior enemy very frequently, and at times when hotly pursued and under a heavy fire of artillery and musketry. A charge in one rank will be more rapid, and consequently more likely to succeed. \* \* \* Everyone will do his duty; skulkers cannot so easily pull up, and such are found in all armies.”

Capt. Nolan, an acknowledged cavalry authority, whose short and promising career was cut short at Balaclava, advocated single rank or the rank entire system with all the fervor of an advanced and able thinker. Many of our modern cavalry authorities are equally in favor of this change, among whom may be mentioned the late distinguished Sir Herbert Stewart.

The writer would not presume for one moment to venture an opinion on the value of the single-rank system in cavalry warfare, except that his good fortune has given him exceptional experience in the training of mounted men; and he unhesitatingly affirms that, given a few good officers and true, he would undertake in a few short weeks to teach and train a mounted force of such men as Australia can with ease produce, organized in single rank, which should manœuvre quicker, more easily, and with less dislocation than a similar force in two ranks after many months—nay, even years—of training in the riding-school system and drill in two ranks as practised upon the Long Valley at Aldershot. It is with some knowledge of the task that the writer ventures an opinion, as he has had the good fortune to raise and command mounted troops in three campaigns, and between 1888 and 1892 it further fell to his still more fortunate lot to train and command in all 270 officers and 3800 men improvised as mounted troops.

It is the writer's view that the secret of success in the effective training of mounted men for war lies in these two factors :

1. Manœuvre in single rank, or rank entire.
2. The squadron system—*i.e.*, the squadron divided into four divisions, and each division into permanent sections of four men, the all-important principle being that the men and horses manœuvre and fight side by side who sleep side by side in the bivouac, or are tethered side by side at the horse lines.

The last condition has been adopted during the last three years by the British cavalry, and the former will undoubtedly follow in a few years hence.

In order to illustrate the advantages and simplicity of the proposed single-rank formation, the following diagrams have been made, and it will be seen that while the proposed system has all the advantage of depth possessed by the double rank, it has also the all-important merit of simplicity.

Diagram I. shows a regiment in line of squadron columns in single rank, by which it will be seen that each squadron column has four distinct ranks, each intact and separately commanded, yet ready to support the one in front. The intervals between squadrons may be either squadron or half-

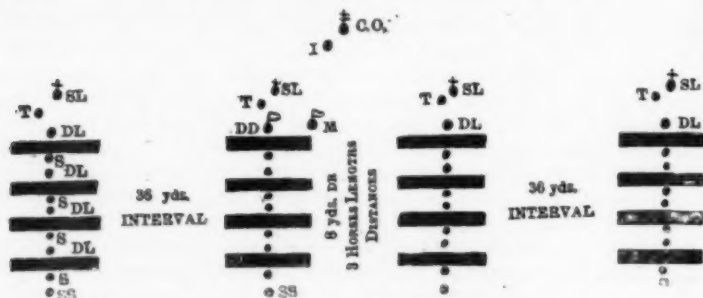


DIAGRAM I.

Regiment of 4 Squadrons in single rank formation at Half-Squadron Deploying Interval plus 12 yards, in Line of Squadron Columns. Each Squadron, 100 rank and file strong, or 4 divisions of 6 sections=24, and 1 serrefile=25; grand total, including Squadron and Division Leaders, etc., 430 of all ranks. Each Squadron in Quarter Column of Divisions, that is, at 3 horses' lengths=24 yds. distance between Divisions.

squadron interval, giving in the first case when deployed a line in single rank, and in the second two distinct lines.

Diagram II. gives a regiment in line of squadron columns in the old days

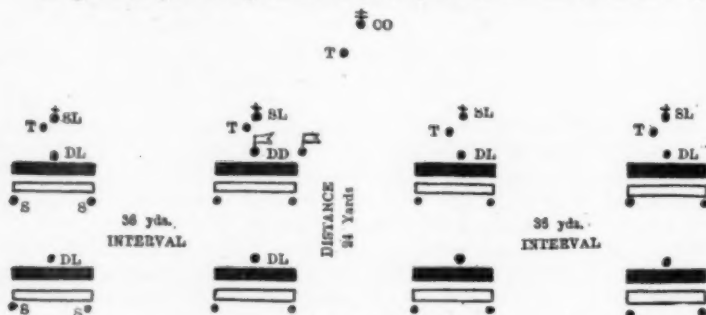


DIAGRAM II.

- Regiment of 4 Squadrons in Line of Squadron Columns at deploying interval, viz.: the frontage of the rear troops of each squadron plus 12 yards in double rank, *i. e.*, front and rear rank formation, *vide* "Cavalry Drill Book, 1885-87."
- Each Squadron, 100 rank and file as in Diagram I.
- It will be noted that the intervals between Squadrons is the same as in Diagram I.

of troops, as laid down in the "Cavalry Drill" of 1885. It will be seen that the number of ranks is the same as in diagram I., with intervals to admit of rear troops deploying into line.

Diagram III. gives the single-rank formation, as in diagram I., deployed into half-squadron columns, which thus with its two lines becomes similar to the formation of 1885 when the squadron was deployed.

With the regiment organized as in diagram I., the three necessary conditions of modern cavalry tactics, as stated above, are, I venture to think, fulfilled, namely:—



- (a) Simplicity, by reason of the single-rank formation.
- (b) Rapidity arising from the facility which a manipulation of mounted men in single rank gives.
- (c) Conformity to modern conditions of opposing fire power in that you have the old squadron system of two double ranks sufficient, as it has been

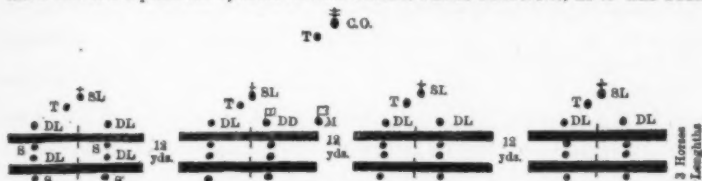


DIAGRAM III.

- (a) Regiment of 4 Squadrons in single rank formation in line of Half-Squadron Columns, closed to an interval of 12 yards between Squadrons, viz.: 1st and 2d Divisions of each Squadron formed in line in front, with its Division Leaders, the Squadron Leader; the 3d and 4th Divisions, in line, *with their Leaders in front of their own Divisions*, formed at 3 horses' lengths distance (from the 1st and 2d Divisions).
- (b) If desired this distance can be increased to wheeling or half-wheeling distance.
- (c) Each Squadron in this formation would have a frontage of 48 yards; the Regiment of 4 Squadrons (with intervals) having a total frontage of 228 yards, and a depth of (roughly) 8 yards. This formation is similar to the Squadron in line as per Cavalry Drill of 1885 or 1892.

proved for purposes of shock, spread over a wider and deeper area, according to the ground and the density of fire, yet each rank is intact, cohesive, and separately commanded.

In diagram IV, a regiment in line of squadron columns is shown, as laid

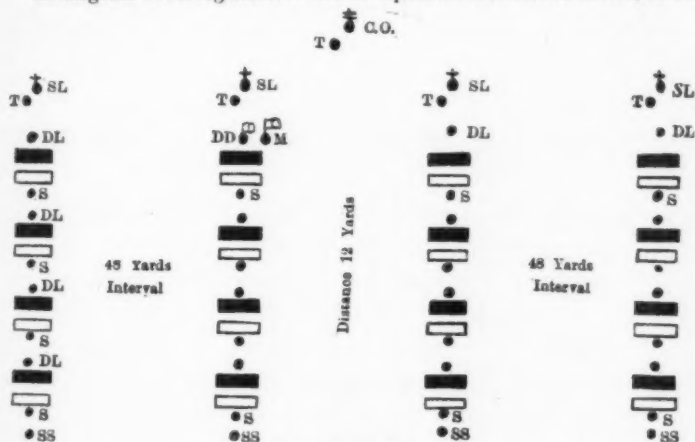


DIAGRAM IV.

*Vide* "Cavalry Drill Book, 1892." A Regiment of 4 Squadrons in Line of Squadron Columns in double rank formation, viz.: 8 ranks from front to rear of each Squadron.

- (b) Squadrons same strength as in other diagrams but half the frontage. The dense character of this formation will be especially noted.

down in the last and most recent Cavalry Drill, viz., 1891, which gives no less than eight ranks, or double that of diagrams I. and II.

There are those who consider that this formation is altogether too dense, and that it is therefore quite unsuited to the conditions of modern fire power with its increased accuracy and long range.

The greatest stress is rightly laid in all modern works on Cavalry Tactics upon the facility of manœuvre in squadron columns, but it requires no demonstration to show that the all-important factors of rapidity and sim-

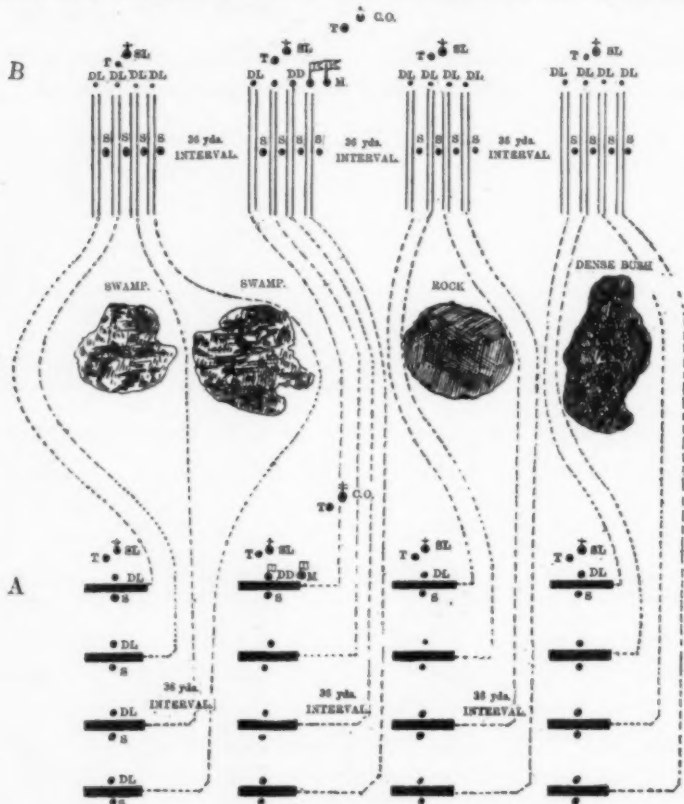


DIAGRAM V.

"BOER FORMATIONS" OR SQUADRON COLUMNS ADVANCING BY HALF-SECTIONS FROM A FLANK.

- (a) Regiment of 4 Squadrons in Line of Squadron Columns as per Diagram I, the command (or signal) is given "Advance in Squadron Column of Half-Sections in 'Boer Formation,' " from the right (or left) of Divisions, "walk" (or "gallop"), "march."
- (b) When manœuvring by signal, after *cautionary whistle*, Squadron Leaders conform to directing division of the Directing Squadron.

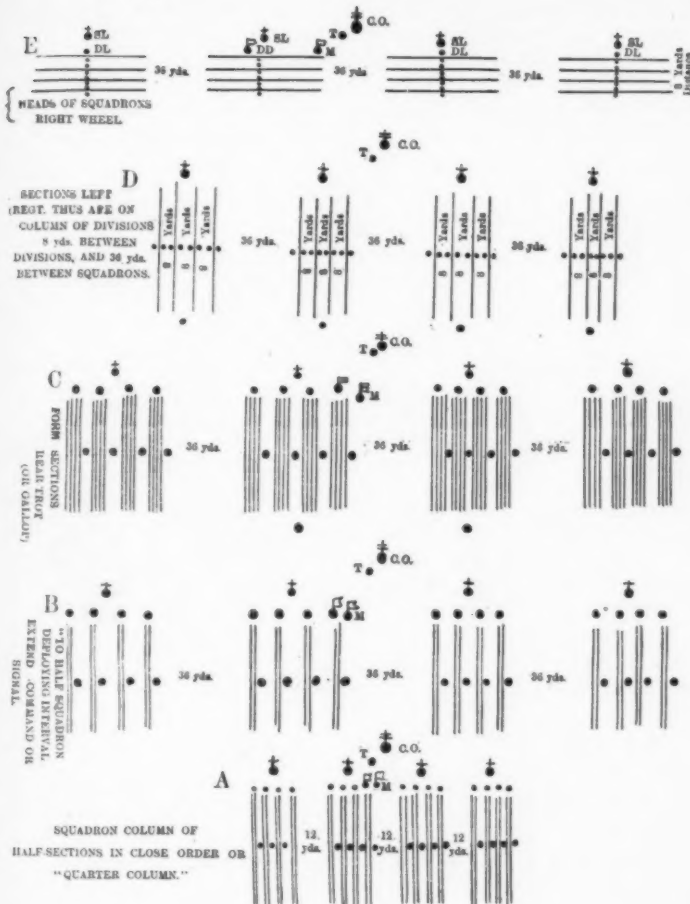


DIAGRAM VI.

Increase of front from Squadron Column of Half-Sections in "Boer Formation," to Line of Squadron Columns, with Half-Squadron Deploying interval, from which, Line of Half-Squadrons (with 12 yards interval) can be formed, *vide* I.

plicity would be multiplied one hundredfold by the abandonment of the eight-rank system for that of the four.

I wish to invite close attention to one single-rank formation in particular, which enables a regiment drawn up in line of squadron columns at half-squadron deploying interval, as in diagram I., to perform with equal rapidity, cohesion, regularity and silence, every manœuvre which mounted troops in the field can be called upon to do. This formation, initiated in South

Africa in 1881, has been adopted by the Mounted Infantry at home, and is carried out by the mounted troops in Australia.

It has been called, for the sake of marking its origin, "Boer formation," since the idea was first borrowed from the Boers in 1881, and is merely squadron columns advancing from a flank by divisions in column of half-sections.

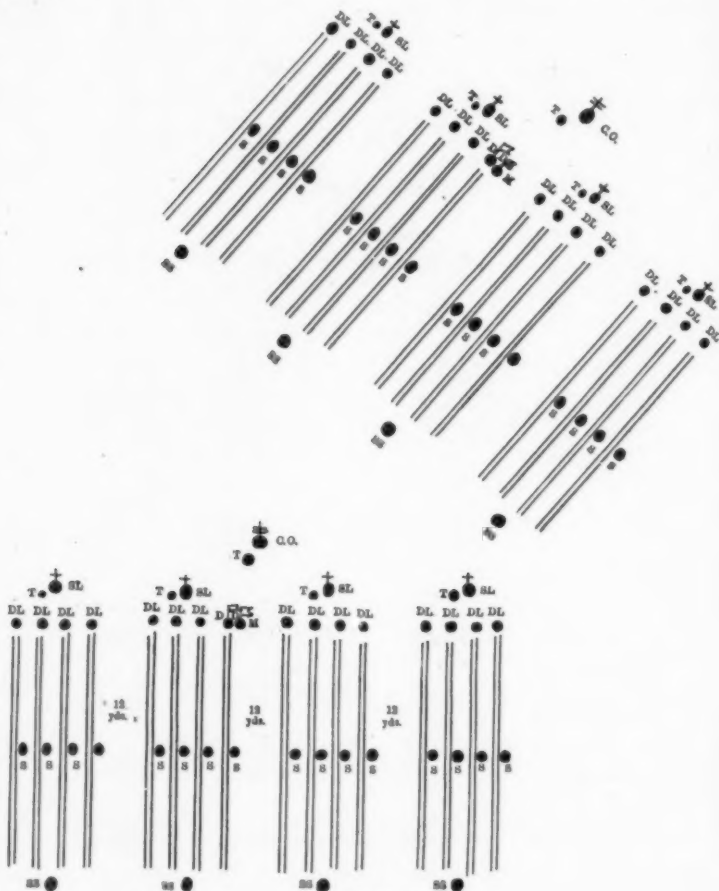


DIAGRAM VII.

Regiment in Line of Squadron Column of Half-Sections, viz.: "Boer Formation." Words of command for instruction only. "Change position half-right on the Squadron of direction." Signal by the Commanding Officer to the Division Leader of Division of Direction in the required direction—Commanding Officer keeping well to the front, and leading his Regiment into the required position, giving the signal "Forward" or "Halt" after the usual cautionary whistle.

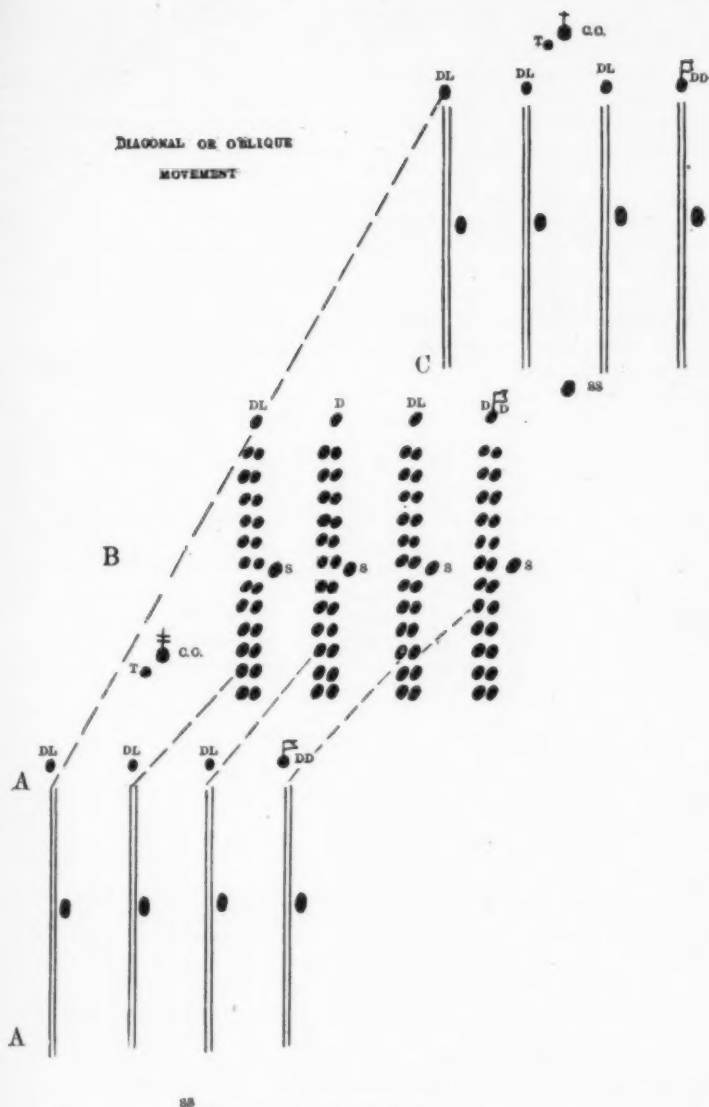


DIAGRAM VIII.

- (a) A Squadron moving by the oblique march to a flank (right).  
 (b) The figures half-way show the Squadron in Half-Sections on the Diagonal march or "Incline," prior to arriving at CC, and receiving the command or signal, "Forward."

In diagram V. this formation will be seen. It will admit of the most rapid manœuvre over broken and difficult ground, giving equal facility for forming to the original front in line of squadron columns, as in diagram VI., or a diagonal movement to a flank, as in diagram VIII., or a change of position, as in diagram VII. A decrease or increase of front is equally simple, as shown in diagram VI.

The simplicity of drill and manœuvre which this system gives can only be realized when seen and practised.

In the foregoing single-rank system at least two of the elements of success for the tactical value of cavalry which were indicated have been proved—namely, (a) simplicity and (b) rapidity. By the last proposed, or “Boer,” formation, the final element of success—(c) conformity to modern conditions of opposing fire power—has been most effectually dealt with. This formation gives the minimum of front, yet with the adaptability to description of ground or physical obstacle, combined with cohesion, and the power of executing with the utmost rapidity any manœuvre necessitated by the evanescent conditions of a theatre of tactical operations or of a field of battle.

#### THE STRATEGICAL POWER OF MOUNTED TROOPS.

Napoleon has told us that the value of troops in war for strategical purposes is in inverse ratio to their rapidity of movement. This axiom is more especially true of mounted troops.

It may be assumed as a corollary to such an axiom that the mounted troops who are to take a great strategical part in war must be capable of a self-sustained and self-contained effort; in other words, that a mounted force, if it is to effect great strategical results, must be capable of acting as an independent factor in war. This is to practically assert that a mounted force capable of independent action must consist of cavalry, artillery, and infantry, to which must, in due course, be added a proportion of those corps without which no body of troops can remain efficient in the field, viz.: Engineers (for Engineer services or for field telegraphy), Medical Staff Corps, and Army Service Corps (including, as this department does, Transport and Supply).

The military student finds with no small surprise that in recent European wars the strategical use of mounted troops has been but little applied.

In the Franco-Austrian War of 1859, in the Austro-Prussian campaign of 1866, and in the Franco-Prussian War of 1870 the independent or strategical value of mounted troops seems to have been lost sight of, or underrated. The lesson of the American War of 1861-65 would seem to have been overlooked alike by Austrians, French, and Germans. Whether it was that, bound down by the conservative tendencies of all standing armies, the real value of the independent action of mounted troops was forgotten or intentionally neglected, it is not necessary to discuss. The fact remains that the cavalry were in each and every case, so far as their power as a *solid strategical factor* is concerned, bound down to the slow-moving infantry columns.

“No attempt was made to emulate those feats of the American cavalry

leaders which exercised such momentous effects upon the issue of the longest and most bloody war of the century. The reason for the success of such leaders as Stuart, Grierson, Forrest, Sheridan, and others is not far to seek. It was that, unfettered by traditions of the past, the Americans armed their cavalry with a repeating rifle, and developed their power of independent action in a manner which has not hitherto been equalled in modern times. What cavalry or mounted troops have ever executed such a feat as that of Stuart, of Confederate renown, who, leaving Darksville on 9th October, 1862, and crossing the Potomac at McCoy's Ford, captured Chambersburg, and thence by a series of unparalleled marches completely circled round the Federal army under McClellan, severing all his lines of communication, and finally recrossed the Potomac on 12th October at White's Ford with a loss of three men?\*

A distance of 144 miles was covered in 76 hours, and portion of the distance—viz., Chambersburg to Hyatt's Town, 65 miles—in 20 hours. So successful was this raid that something near akin to a panic seized the money market in New York, and a momentary paralysis of uncertainty made itself felt throughout the whole Federal army, and there further resulted a temporary collapse of the Federal cavalry, which had wasted itself in a fruitless effort to pursue. Yet Stuart's cavalry, so little affected were they by their splendid exploit, contested the advance of the Federal infantry, when, some days subsequently, in overwhelming numbers they crossed the James.

This great raid of Stuart's does not stand alone, and if time admitted descriptions might be given of Forrest's or of Morgan's numerous Confederate raids in Tennessee, of Grierson's great raid from Knoxville, Tennessee, in the North, across the State of Mississippi to Baton Rouge in Louisiana, in the South, 1000 miles in 24 days—a feat which paved the way to the capture of Vicksburg, and the seizure by the Federal troops of the Mississippi, the great highway of the Western States. A description might be given of Sheridan's final exploit with his three divisions of cavalry, which, by what General Grant called "Sheridan's throttling process," cut the line of retreat of the Confederate General Lee by a long sweeping movement, and brought about the closing surrender and the collapse of the Confederate cause at Appomattox Court House in April, 1865. What nation has such a record to show as these of great strategical feats successfully achieved by masses of mounted troops?

In earlier times in the Napoleonic campaigns of 1813 and 1814, the Russian cavalry operations were organized and led in a far bolder manner than in any previous campaigns of that age. Among the most famous may be mentioned Tchernikoff's operations far in rear of the French army after the battle of Grossbeeren in the autumn of 1813. On this occasion the Russian leader, well emulated thereafter by the American commanders, advanced 140 miles at the head of 3000 horsemen and four guns into the heart of Westphalia, and captured and retained possession of

\*The Confederate force consisted of three small brigades, under Brigadier General Wade Hampton, Colonel W. H. F. Lee and Colonel W. E. Jones, numbering 1800 of all ranks.

A battery of four guns, under Major John Pelham, completed the column under Major General J. E. B. Stuart.



Cassel, the capital of that kingdom, for more than a week. "The effect of this stroke," says Allison, in his history, "was soon felt through the whole north of Germany." In the same year, Tetterborn, another Cossack leader, captured Hamburg by a similar feat. Platoff, again, with 7000 Cossacks and Austrian horse from Bohemia, encircling the French upon the Elbe, attacked and routed far in their rear at Altenburg, the French cavalry under Le Fevre-Desnouettes.

Subsequent to the American War the advance of Gourkha across the Balkans with a mixed force of cavalry and lightly-equipped riflemen, in July, 1877, may be cited as the first attempt by European troops to develop a similar "strategical power."

Coming nearer home, we are proud to recall the great strategical march of Major General Sir Drury-Lowe's cavalry division in 1882 which captured Cairo by a *coup-de-main*, and at one blow arrested all the further bloodshed and all the loss of life which would else have followed upon the rout of the Egyptian troops by Lord Wolseley at Tel-el-Kebir. The bold strategical march of the cavalry ordered by Lord Wolseley (a close student of military history) is the latest and best illustration of the system which the American leaders had initiated twenty years before, and forms a fitting close to that short and brilliant page of our military history.\*

I should, however, be wrong to omit a very important instance of what can be achieved by mounted troops against savage and warlike tribes operating in a difficult and bush-covered country. The result of the short and sharp Matabele war is still fresh in our minds. In a few short weeks a column of less than 800 mounted men completely crushed and overthrew the most warlike and savage people known south of the African Equator—a people kindred in race and military organization and prowess to that Zulu nation which cost England an expedition of 24,000 British troops of all arms and a difficult campaign planned and carried out according to the recognized orthodox but costly laws of modern war.

A due appreciation of the value of mounted troops for such warfare, and a knowledge of the necessities for rapid movement in dealing with savages, saved in this instance a very serious campaign, which would undoubtedly have proved from its many difficulties costly alike in valuable lives and in public money.

Let us consider what gives this strategical power—this power of inde-

\* The following Cavalry force took part in the above-mentioned march, Major General Sir D. Drury Lowe, K. C. B., commanding.

{ Household Cavalry,  
4th Dragoon Guards,  
7th "

{ 2d Bengal Cavalry,  
6th "  
13th "

N Battery, A Brigade, Royal Horse Artillery.

Mounted Infantry.

Mounted Detachment Royal Engineers.

17th Company Army Service Corps.

This force marched from Kassassin at 8 P. M., September 12, 1882, took part in the battle of Tel-el-Kebir at daylight, the 13th, and marching soon after captured the citadel of Cairo at 8 P. M., September 14th.

A strategical march of 70 miles in 48 hours.

pendent action—to mounted troops. It is, I would submit, that they shall be self-contained; it is that they shall have with them the fire power which will enable them to compete on even terms with whatever description of an enemy's troops they may come in contact with.

Cavalry must therefore not only be trained themselves to use a fire-arm dismounted and with effect, but must be accompanied by riflemen or by infantry, who, though mounted, shall be so armed and trained that they can deal with an enemy's infantry or cavalry dismounted in a manner which no cavalry, organized and trained as modern British, German, French, or Austrian, cavalry, can ever hope to do. The mounted force must further have its horse artillery; must have its mounted engineers, who, as specialists, can repair bridges, destroy railways, or tap telegraph wires; and must have its medical staff, who, with cacolets and field ambulance, can collect and transport the wounded whenever found.

Let me close my remarks by reminding you that the mobility of mounted troops for strategical purposes must be necessarily in direct ratio to the quality of their horses.

There are four descriptions of horses required for military purposes, namely:

1. The Heavy Cavalry horse of bone, quality, and power, 16.0 hands.
2. The Light Cavalry horse of good body and good quality, 15.2 hands.
3. The Artillery horse of power and activity, 15.2 to 16.0 hands.
4. The Transport horse of bone and power, 15.2 hands.

The medium class, or light cavalry horse, may be estimated as representing to a European military power £75 pounds as a five-year-old, or at the commencement of its military life. It may be calculated that 30,780 horses of all kinds are yearly required by the armies of Great Britain, France, Germany, and Austria—viz., France, 14,100; Germany, 9370; Austria, 5840; Great Britain (exclusive of India), 1470. This enormous number is with extreme difficulty supplied even in times of peace; with the strain of war the demand for horses would be prodigious.

The importance of developing a trade in horses now in times of peace, with the prospect of increased demand in time of war, I leave to some more able pen than mine to show.

## MILITARY HISTORY.

(From the *Saturday Review*.)

THE *Zeitgeist*, which tends in these days to reduce everything to its commercial value, and prefers quick returns and small profits to the solid accumulations of years of patience, has left its mark on our military studies as on most other things. Deep learning no longer characterizes our celebrated judges in as marked degree as it did their predecessors. Theological profundity is out of fashion, nor is it any more an essential factor in a gentleman's character that he should be something of a scholar, and, if not equal to quoting Virgil or Horace himself,

should, at any rate, be able to appreciate a quotation from them. Greek and Latin are weighed against science, and modern languages by the parent anxious to give a useful education to his son; he no longer strives for the cultivation of the youthful mind, but rather hopes to render it equal to grappling with examination papers. It is with the soldier's as with the other professions. We used formerly to teach military history, and a boy was encouraged to dwell lovingly on the lives and deeds of the great captains. Time is too short nowadays for such cumbrous methods. We want men to know only just enough for a definite purpose, and so "tactics" pushes history out, and an officer fancies himself a general when he knows how many men placed in a row will occupy a given number of yards, or how much further a rifle bullet will penetrate into deal boards than into oak. He learns the "characteristics" of cavalry, infantry, and artillery from a bald text-book, and, while a subaltern, carefully abstains from reading anything that lies beyond the syllabus for promotion to the rank above him. Yet it is when we are still young that our notions are most abidingly moulded, and to become intuitive, a habit of thought must take root in early youth. Neither do the noble chances of war lie open only to seniority. Many a subaltern is older nowadays than was Bonaparte at Marengo, or Wellington at Assaye. On the field of battle events move fast, and a man should be equal to more than it seems probable he may be called upon to face when he begins the day. And if he is to be undismayed in the face of all eventualities, he must study the experiences of others, since in these degenerate days he can scarcely rely on any of his own. The hair of those, even in France and Germany, who have served in European warfare is fast becoming streaked with white, while in our own army the survivors of the Crimea on the active list are becoming scarcer daily. It is to military history, therefore, that officers must now turn for guidance, and they may reap experience and knowledge of a lasting kind from its pages if they be rightly read. Yet in the bustle of our full days it is thought that it is mere useless labor to wade through heavy volumes when facts and formulas containing all the rules and principles of warfare can be extracted from them and learnt by rote. Why go into the fields to gather the nut one's self when the essence of its kernel can be bought for a few pence in the nearest chemist's? Those who argue thus turn the student from history and give him tactics; bid him learn just what his immediate needs demand, and feel confidence in a set of well-digested rules adapted for his guidance in every conceivable eventuality. It is the old story of Molière's fencing-master. If your adversary does so, you do so; there must be a sequence and method in all your actions; and if you are not a hopeless pedant, you may possibly be a great general. The older-fashioned plan was first to become imbued, if possible, with the spirit and love of the game, to understand its broad features, and then to examine closely into the reasons why one man was successful where another failed. We did not try to master the details of the machine which answered so quickly to the hand of some splendid genius until we had been captivated by the ease and swiftness of its movements. If you wish a boy to become a whist-player, you let him begin at "Bumble Puppy" with his schoolfellows, and enjoy the zest of gambling, which is part of human

nature. Then you lead him on to read the book, and watch the play of finished performers. Finally he will come to master and appreciate the small niceties of the game, and will develop, very likely, real talent. But, if you began by giving him "Cavendish," and telling him to learn the "leads" and returns, he would either grow weary and disgusted with the whole thing, or his play would gradually assume a cast-iron kind of style, unmodified and uninfluenced by the particular circumstances of the moment. In a word, he would be one who would almost surely fail when nerve or judgment was called for. A schoolboy or cadet reading Napier or Kinglake is fired with the zeal and enthusiasm which are the foundation of military capacity. If he is of the stuff of which generals are made, he soon begins to leave the glowing stories of fights and encounters to inquire why they were brought about, and, lastly, examines the mechanism by which they were carried through. He is at first in the position of a general spectator, then of a professional man seeking knowledge, finally of an expert looking into technical minutiae. At the outset the day's operations are scarcely understood; it is the picturesqueness of the spectacle, the noise, and the excitement that attract. Gradually a meaning and intention are recognized amid the apparent confusion, and eventually even the smallest movements are appreciated and criticised. It may, of course, be plausibly argued that it is mere waste of time for a youth who has never been on guard or carried a color to read of wars in which armies, perhaps several hundred thousand strong, took part, and that it will be time enough to turn to these when he has mastered the movements of a company or squadron. By the same process of reasoning we ought not to let a boy touch Greek or Roman history until he has become thoroughly versed in that of his own county or parish, and the mysteries of local rates and taxes would more profitably be studied by us all than the story of the levying of ship money or the unconstitutional taxation of the Stuart kings. The one touches our daily life, the other is not certain to affect our future. While, however, in that case the country might gain in its stock of ability of the vestryman type, it would certainly be poorer as regards statesmanship; and so in the army we may train good battalion leaders by our new methods, but are not likely to encourage the budding genius which might be equal, with an opportunity, to the making of history.

Far be it from us, however, to assert that the close examination of minute details is not of benefit in the study of war as in every other. First encourage a man to become saturated with the spirit of the subject, so that he will act intuitively in a crisis as he should, not because there is a cut-and-dried rule which he has been taught must govern him, but by a sort of instinct, the logical force of which he is scarcely conscious of, and then, when he goes into small niceties, let there be enough human nature about the form in which they are presented to him that they may attract, and not repel. The details might often be made to assume the same place in the complete narratives as personal anecdotes do in general history. Every principle might be driven home by an apt illustration from real life, and a moral might often be pointed by dwelling on some small feat of arms too often forgotten altogether, or baldly dismissed with a mere reference. The

memoirs, diaries, and reminiscences, of which some of great excellence have lately appeared, are for this reason of far higher value for educational purposes than might at first sight be supposed. Kincaid and Mercer are full of valuable hints, and the "Diary of a Cavalry Officer" in the Peninsula and at Waterloo, which has lately enlivened us, will teach a good deal also to those anxious to learn. Facts are always interesting, and in every narrative truthfully and carefully written there are many that are eagerly noted by those who want to think as well as be amused. Indeed, it is to be hoped that the commendable habit of keeping a diary which has preserved so many personal experiences from the big wars for us will not die out amongst our present and future officers. But, while we urge them to write, let us beg them to set down nothing but what they can personally vouch for. Picturesqueness may be left to the war correspondents. What we want from officers is close accuracy and information which years afterwards we, or our successors, may lean upon with undoubting confidence. We desire realism, but not the realism of stage effects. If guided through them by a competent instructor, we imagine a subaltern will learn more that will stick in his memory from the perusal of the letters written to Siborne by officers who described what they themselves saw at Waterloo than he will if he learn perfunctorily by rote such phrases from a manual as that which sonorously asserts that a charge of cavalry should be "sudden, rapid, and opportune." So certainly it should; but the man who glibly spouts out the lesson would be more likely to turn it profitably to account if he derived his convictions from the story of Ponsonby or Von Bredow. And the mention of these two names brings us to another point. The same shortsightedness which would limit a student's range in military literature to those portions which deal only with his particular sphere of action is often inclined to reject all but the most modern war as mere ancient history, and of sentimental rather than professional interest to us. With this view we find ourselves as little in sympathy as with the other. The human element is a factor in warfare, which, however armaments may alter, remains forever the same. Men are no braver now, if indeed they are so brave, than they were a hundred years ago. They are liable to the same sudden panics, they are equally prone to give way to headlong excitement, they need restraint and guidance fully as much now as they did then. When the union brigade swept down the hill at Waterloo, they penetrated into the French position just as Von Bredow did at Mars-la-Tour, in spite of chassépôts and mitrailleuses, because they were well led. Afterwards both brigades came to sorrow, and lost heavily in a precisely similar manner, and again for the same reasons in the one case as in the other. Here we have exactly the same lessons conveyed, exactly the same causes at work, exactly the same results produced; and one fight was fought fifty-five years before the other, and one brigade charged infantry armed with flint-locks and the other men with modern breech-loaders in their hands. This is but one illustration of a truth which is reproduced in numerous forms and instances, but it is enough to make any one who despises ancient history ponder, and it is probably no exaggeration to assert that for every error in 1870 an antidote might have been discovered had those concerned but remembered the teach-

ing of the past. We cannot afford to do without the help the experiences of our fathers or grandfathers may bring us; and, even if we could, we should soon have nothing at all to serve as a basis for our discussions. Because inventions follow one another now so rapidly that it might very plausibly be argued that it is only the very newest which is new enough. What was a novelty ten years ago is often all but obsolete to-day. Were we to disregard history, we should soon find ourselves tossed helplessly about in a sea of speculation, and there would be no firm ground for our feet to rest on while we might take breath. It is facts, whether they occurred yesterday or in the last century, that alone give us a resting place; and when we go to seek them we should let our judgment, and not artificial restrictions, circumscribe our range.

## RANGE AND POSITION FINDING FOR PURPOSES OF GUNNERY.\*

A LECTURE PREPARED FOR THE INTERNATIONAL CONGRESS OF ENGINEERS  
AT CHICAGO.

By WILLIAM OLIVER SMITH.

(*Elliot Brothers, London.*)

THE subjects of range and position finding are so intimately connected that in the first part of this paper at any rate, it will not be necessary to draw any distinguishing line between them; the greater subject, position finding, includes the less, that of range finding.

1. It is hardly necessary to state that, to attain good results from the very accurate weapons which modern armies possess, there must be some method of determining ranges.

Knowing the ranges, the gunner can give an approximately correct elevation to his piece provided he can see the target.

If, however, he cannot see the target, two more data are necessary to enable him to lay; these are:

(a) The difference of altitude between the gun and the target.

(b) The direction of the target in azimuth.

Any method or mechanism which enables the gunner to arrive at these three data—range, difference of level, and direction—may be termed a position finder.

2. Modern ordnance may roughly be divided into two great classes, viz.:

(1) Rifled guns.

(2) Rifled howitzers or mortars.

For a variety of reasons which it is not necessary to discuss here, the main object of all gun construction has of late been to obtain a high vel-

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ocity for the projectiles of the first, and a steep angle of descent combined with fair velocity for the projectiles of the second class of ordnance.

Gun projectiles have, therefore, a flat trajectory, and it is essential that no obstacle of any considerable height should intervene between the gun and its target.

With howitzers and mortars, however, this is not an essential; owing to the high trajectory of their projectiles, natural features of considerable height, such as hills, and even mountains, need offer no insuperable difficulties to bombardment at long ranges.

3. Mountings of ordnance can also be divided into two great classes, viz.:

(1) For ordnance to be mounted in permanent emplacements.

(2) Movable and mobile mountings.

Speaking generally, the first class of mountings consist of a turntable which enables the gun to be turned rapidly on to any target or direction in azimuth. On this turntable the piece is mounted, and is capable of being elevated or depressed to any required inclination of the horizon.

For various reasons it is very desirable that the turntable should be capable of revolving without thereby altering the angle of elevation or depression given to the gun mounted on it; this consideration, as well as that of possessing the necessary stability under great strain, entails considerable weight in all the parts and a very solid foundation which cannot be improvised at short notice.

The aim in movable and mobile mountings is to render them capable of withstanding the shocks of discharge of as heavy a gun as possible, without losing the mobility requisite for the various natures of siege and field ordnance; and thus the conditions of the case put all but improvised foundations out of the question, whilst regular turntables are impossible. The utmost that can be obtained in this direction being the provision of some sort of pivot in the case of siege ordnance.

It is almost impossible to train these guns without altering to some extent the vertical angle which the axis of the piece makes with the horizontal plane.

With field guns, of course, nothing of the sort can be attempted. Here it would be well not to ignore the portable cupolas which have lately been experimented with in various countries; these are still on their trial, and considerations of how to apply range and position finding may be postponed.

Some sort of range finding is very desirable in the case of all the different natures of ordnance mounted in the various manners alluded to, but position finding has up to the present been only used in connection with the heavier natures of ordnance mounted in permanent emplacements.

#### THE DATA ESSENTIAL TO ENABLE GUNS TO BE LAID UNDER A VARIETY OF CONDITIONS.

4. The conditions under which a gun can be laid on a target are as follows:

(a) When the target is visible to the gun layer.



(b) When the target is occasionally visible to the gun layer.

(c) When the target is not visible to the gun layer.

5. In the first case the tangent scale can be employed to give elevation, and the speed of the target as affecting range can be allowed for on it. The speed of the target as affecting direction can be allowed for by using a sliding leaf on the tangent scale, and this correction can be combined with that which makes allowance for wind, while that for drift can be made either by means of the above leaf or by setting the tangent sights at an angle to the vertical.

Quadrant elevation can also be used. In this case, however, it is necessary that any difference in altitude between the gun and the target should be known and allowed for.

Again, it might be convenient when firing at a fixed target and when the correct tangent elevation is known, to measure the quadrant elevation of the laid gun by means of a clinometer or some such device, and afterwards to continue the practice, using quadrant elevation.

The gun would, in the above instances, be laid directly on the target, the layer aiming over the sights.

6. In the second case it is easily conceivable that a target might be visible to the gun layer at the commencement of practice, but that smoke, fog, darkness, or some other cause might make it impossible to continue direct laying.

In this event the quadrant elevation could be measured as just described, and the direction obtained by either laying down a line of fire on the ground by means of a training arc, in the case of guns on turntables, or by placing auxiliary marks either in front or behind the gun.

7. When the target is not visible to the gun layer the non-visibility may be caused by the intervention of some natural feature between the gun and target, or by smoke, fog, or darkness, or when in the case of a moving target it is not certain to be visible when the gun is required to fire, as, for instance, in consequence of smoke from an adjoining gun, or in a casemate.

In this case quadrant elevation must be employed, and before it can be arrived at both the range and relative altitude of the target must be known. The gun must be laid for direction by something of the nature of a training arc, by laying on auxiliary marks, or by taking the line from the gun to an auxiliary mark as a meridian and measuring angles in azimuth from it.

8. But here a difficulty comes in: How is the speed of the target, wind, or drift, to be allowed for on a training arc, or in laying by means of an auxiliary mark?

Now the speed of a target can be resolved into two speeds, one in the direction of the line of fire, the other at right angles to it; the former of these affects the elevation, the latter the direction, given to the piece.

The correction to be applied in both cases depends on the time of flight of the projectile, the time of flight in its turn depending on the range.

To obtain the necessary correction it will generally be sufficiently accurate to consider that the time of flight of a projectile varies directly with the range; if, therefore, we can determine that an allowance of a certain number of degrees or minutes on the deflection scale will compensate for a

given speed at a given range, then the same angular allowance will be correct for any other range.

This is, of course, only approximately correct; as the range increases so does the time of flight of a projectile over equal portions increase, and if practice were being carried on at a moving target at a very long range, it would be advisable to make use of a more accurate method.

It is generally considered sufficient to allow for wind in a similar manner. It will subsequently be shown that this approximate method may, in this case also, give very inaccurate results at long ranges.

Drift cannot be allowed for, even approximately, in this manner, and at long ranges a special correction must be made; this is particularly the case with howitzers.

The algebraical sum of these three corrections can be allowed for on the training arc, or can be considered as deflection where laying from an auxiliary meridian line.

9. So far we have neglected a number of factors which prevent the range tables prepared for guns under normal conditions being always reliable. This is quite irrespective of possible errors in loading and laying—

And these are:

(a) The powder charge, though of correct weight and gravimetric density, may not be of normal strength, and the muzzle velocity may be thereby affected.

(b) Variations in the density of the atmosphere, as affected by barometric pressure, moisture, and heat, alter its resistance to the passage of a projectile, and may thus affect the range.

(c) Wind affects a projectile both in range and direction.

There are other factors, but the former are the most important.

10. From the above considerations it will be seen that it is not sufficient to know the exact range and direction in azimuth of a target, and that if we adhere slavishly to the normal range tables we can hardly expect good results.

Were unlimited time at our disposal it would of course be possible to work out all the above corrections mathematically, but irrespective of the fact that the calculation is not by any means a simple matter, it will be found when firing at a moving target that only a few seconds are available for the purpose, and that any but the most simple sums of addition or subtraction are out of the question, and that even these are undesirable.

It is this consideration of time which makes complicated mechanism necessary, as it is very important that the elevation and direction in azimuth required to be given to the gun should be shown to the gun-layer automatically, and that he, at least, should have no calculations to make.

11. The range table of a gun is prepared from the results of experimental practice, and corrected to a mean height of barometer and thermometer and dampness of atmosphere; any wind on the practice day is also allowed for.

Now it is very unlikely that all these conditions will recur on service, and if we wished to get a mathematically correct range table on any par-

ticular day the following are some of the steps which would have to be gone through, and firstly we must find the muzzle velocity.

This is not an easy matter without most elaborate instruments; we can get an approximation by considering the effect which climate and the age of powder are known to have on the muzzle velocity; from those an empirical formula can be arrived at.

We must then find the density of the atmosphere and its degree of saturation by moisture, and resolve the velocity of the wind into components affecting the range and direction of the projectile. From these, by the aid of ballistic tables and having due regard to the experimental data, a range table can be prepared.

This would entail a very long process and before it was finished some of the conditions would certainly have changed, and it will be allowed that such calculations are quite out of place on service. We must be satisfied to use an empirical rule which will generally give an approximation to the correct elevation at various ranges, and there should be some mechanism capable of being adjusted to convert the angles of elevation according to this rule.

12. Let us now take a practical case.

A ship is advancing directly on a battery at 10 miles an hour, and it is apparent that the guns cannot be loaded and laid until she is about 3000 yards off.

If the guns are laid for 3000 yards range it is evident they must be fired before the ship reaches that point so as to allow time for the projectile to reach that spot just as the ship arrives. Here the matter is entirely one of range; the guns can be kept-pointing continuously in the direction of the ship's advance.

Now suppose the target to move diagonally across the line of fire from right to left at an angle of 30 degrees and speed of 10 miles an hour. The speed can be resolved by the parallelogram of velocities thus:

The range is being reduced at  $8\frac{1}{2}$  miles an hour, and the target is moving across the line of fire at 5 miles an hour. Allowance has to be made in both elevation and direction for the time of flight of the projectile to 3000 yards range. This can best be done by determining how far the target will move during the time of flight of the projectile, and by firing the gun when the target arrives at this distance from the point on which the gun is laid.

In other words, we must observe the course of the target and make up our minds at what point in the future course of the target we will lay the gun; then we must measure back from this point the distance which the target will cover during the interval from the firing of the gun to the striking of the projectile. This is the point of the target's course at which the gun must be fired, while all measurements for range, direction, etc., must be made for the predicted point.

13. The most convenient way to do this is to arrange for having the course of the target plotted out on a map or chart, automatically, if possible. This matter will be gone into more fully when we come to the subject of position finding on a sea front.

14. It must not be supposed that all the calculations in article 11 are necessary on every occasion, or that it would be practically possible to make them.

In practice it is usual to fire a round or two as a trial and to correct by the result. This, moreover, is all that is necessary, provided the range does not alter much before the next round is fired.

But the target may be a ship moving at a speed of 20 knots an hour, and a heavy gun cannot be fired much oftener than every three minutes. It follows that if the first shot were fired at 5000 yards range the next might have to be fired at 3000, and at this range the same correction as at 5000 yards will not answer.

For the correction in degrees or minutes of elevation for variations in muzzle velocity varies more or less directly with the angle of tangent elevation. Those for variations in density of the atmosphere or for wind are most irregular, the nearest approximation being, perhaps, in a duplicate ratio to the range.

15. Now, if all these corrections were worked out for any high velocity gun and tabulated and the algebraical sum of correction for different ranges added to the normal elevation for those ranges, we should get a series of angles of elevation differing from the normal angles in an approximately constant proportion, which we may express as a constant percentage increase or decrease from the normal elevation.

16. Experience proves that this approximation is, as a rule, sufficiently accurate for our purposes at moderate ranges; but, at extreme ranges, at 10,000 yards, for instance, and especially with low velocity guns, such as howitzers, the corrections are so irregular that they should be allowed for separately, if possible.

17. In any case, the knowledge of the actual range of a target and its direction in azimuth is only useful as a basis for calculation more or less complicated; and when this calculation has been arrived at we must make further additions or subtractions to allow for difference of altitude of gun and target, and for the speed of the latter.

18. As time is a matter of extreme importance, it will be seen that when firing at moderate ranges it is desirable to have an arrangement which will permit the operator to add to or subtract from the elevation normally due to that range such a percentage as will make the gun shoot correctly to that particular range, and which, should the range be changed subsequently, will automatically continue to add or subtract a similar percentage.

19. When firing at extreme ranges a more complicated arrangement is desirable; in fact we must try to devise a sort of mechanical calculating machine, or ready reckoner, which will combine the algebraical sums of the corrections due to various causes with the normal elevation due to actual range.

20. And it must be confessed that there are serious mechanical difficulties to be overcome before a satisfactory machine of this kind can be produced. That it can be produced there is no doubt whatever, but there would be great difficulty in persuading practical gunners to adopt it, in which case the simpler instrument first mentioned must be made the most of.

21. According to the simpler approximation scheme mentioned in article 15, all the corrections were lumped together and expressed as a percentage increase or decrease of elevation. To take a practical case:

22. A gun is laid for 5000 yards range, and the shot falls 250 yards short. To make the next shot range correctly we should have to give elevation sufficient to make the shot range to about 5265 yards under normal conditions.

23. Tangent sights are generally graduated in yards as well as in degrees. If the gun is being laid by them no reference need be made to the horizontal plane at all.

But in certain cases guns must be laid by means of a quadrant scale. If the target were always on the same level as the gun this could be graduated in degrees corresponding to equal intervals of range like the tangent scale. This, however, is only an ideal condition, the nearest approach being when the guns fire over water. The target is then at a constant level below the guns, and there is no difficulty in making a quadrant scale under these circumstances.

Should the level of the water change, as in tidal waters, a mean height can be taken and the scale graduated for that; and if the rise and fall of the tide is not considerable the slight inaccuracy will not be of much account so long as the gun shoots normally; but if it is necessary to add or subtract a percentage of the elevation an error immediately comes in, for the ranges on the quadrant scale being complicated with corrections for height, we should also unconsciously add or subtract a portion of elevation due to the height of the gun above the target.

It will therefore be better, when using quadrant elevation, to keep the elevation due to range separate from the depression due to height, until all necessary corrections have been applied to the former.

When this is done, it will be unnecessary to graduate the quadrant scale for equal intervals of range.

24. In cases where the difference in altitude of gun and target vary, as when firing over any land range, it would of course be impossible to graduate the quadrant scale in that manner, and by adopting the above plan a uniform scheme may be established.

25. Let us now take a practical case, and assume that either simple calculating mechanism is available or that considerations of time permit of simple sums being worked out.

The actual range is taken as a basis; this is converted into degrees of elevation, and the corrections for height added or subtracted. The direction is corrected for drift. The first round is fired and the result observed, a permanent percentage addition to or subtraction from the normal elevation is determined on according as the shot falls short or over, and the original correction for height applied.

A similar permanent correction is also made in the direction should the shot have fallen to the right or left of the line of fire; this is combined with correction for drift.

Suitable mechanism can be devised to continue making these corrections automatically, and in proportion to the normal elevations should the latter

change; elevation will be read off in degrees and minutes, and direction in degrees and minutes from a given meridian.

Should no such mechanism be available, a short calculation will have to be made for each round. During ordinary peace practice there is no reason why good results should not be obtained in this manner; but in the hurry and excitement of action it is probable that mistakes would result, which would not only lead to the loss of the round then fired, but would also lead to false conclusions being made as to data for further rounds.

26. It will be interesting to compare with this simple case a more difficult problem, as when firing from a howitzer at a range of about 10,000 yards.

Now suppose the same conditions of atmosphere, etc., exist as when the range tables were drawn out.

In this case it would only be necessary to know the range accurately, and the correction for altitude; should the range change the latter correction would be changed accordingly. But it is not at all likely that the normal conditions would recur, and we have therefore to consider the possibilities alluded to in article 11.

Suppose now, that the howitzer is laid, as would be the case under normal conditions, for 10,000 yards, and that the shot falls 500 yards short, and 200 yards to the right of the direction to the target. We should be justified, drift being already allowed for, in assuming that the error in direction was due to wind, and this could be allowed for in the next shot by giving 23 minutes right deflection, or allowing the same amount on the training arc. There would be no difficulty in giving sufficient increase of elevation to bring the next shot to range, provided we could be sure that the first round was not an abnormal one, under the then existing conditions, and also provided that the range of the target had not altered to any great extent.

But before the next round can be fired the target may have moved in to 8000 yards. (Article 14.)

Let us assume that the normal elevation for 10,000 yards is 40 degrees, and at 8000 yards 28 degrees. Now, if the original loss of 500 yards when firing at 10,000 yards range was due to a decreased muzzle velocity, we may expect that if 4 degrees (240 minutes) will compensate for 500 yards range, 2 degrees, 48 minutes will be about the proper correction at 8,000 yards (vide article 14), for giving 4 degrees compensation at 10,000 yards range, and 2 degrees 48 minutes at 8000 yards, is the same as giving a 10 minute increase to every 100 minutes in the elevation. And with this correction we should probably obtain an effective round, provided the original error was due to decrease of muzzle velocity; but if the decrease of range had been due to increased atmospheric pressure or opposing wind, the chances are that the shot would range too far.

27. This will serve to demonstrate that when firing at extreme ranges every endeavor should be made to discover to what cause variations in range from the normal are due and that, where it is possible to determine these factors beforehand and allow for them it will be a great advantage.

Now the atmospheric pressure, moisture, and temperature can be determined beforehand, and theoretically there is no difficulty in allowing for



them; this is also the case with wind, but as we cannot be certain that the wind currents will be the same at different altitudes to which projectiles fired at these extreme ranges must rise, it would appear that any correction for this factor must be merely tentative. This is also the case for variations in muzzle velocity. The proof of the cartridge lies in the shooting, and though we may have a general idea that cartridges of a given issue will give certain results, one cannot be sure until a few rounds have been fired.

We have thus one factor (atmosphere) which can be determined beforehand and two (muzzle velocity and wind) which cannot be so determined with any certainty, and it is doubtful if it is worth while to construct an elaborate mechanism to eliminate one factor and get an approximation to two others. Should we desire to do so, the following process will have to be gone through:

28. Given the age of the powder and the dryness or otherwise of the cartridge store, deduce the probable muzzle velocity. From this calculate the elevation, taking into account the state of the atmosphere and wind. To this apply the correction for altitude of gun and target. Should the shot not range correctly, one or other, or both, of the unknown factors must be held responsible.

This, it will be allowed, is hardly a practicable method. The better plan would be to select and blend the powder charges to be fired at long ranges, or all the new issues of powder might be reserved for this purpose. The most important factor of error would thus be eliminated.

29. There is an idea abroad that instruments for range and position finding must necessarily be very complicated. This, however, is not so. Very effective position finding may be done with improvised appliances.

The simplest way of finding a range is to locate on a map the position of the object the range of which is required. The map in this case acts as both range and position finder. The only difficulty experienced is in fixing the position of the target on the map. There should as a rule be no difficulty in fixing the position of the observer nor of the gun, the fire of which is to be directed by his observations.

But the first difficulty is often insuperable, even when in possession of most accurate maps, and then some form of range-finder has to be employed.

Many forms of range finders have been invented, each with its various claims to consideration; but they are probably all inferior to a good map when it is possible to make use of one.

30. All that range finders can do is to perform the operations of the surveyor in a rapid and generally inferior manner. The surveyor fixes his points by triangulation, making his triangles as nearly equilateral as possible. If the distance of the point to be fixed is great, the length of the base must also be great.

It would be impossible to make use of long bases in the field, although it may be possible, and even desirable, to make use of them in position and fortress warfare and in coast defense.

31. Here we may divide range and position finders into two classes—short and long base instruments. If one of these instruments is employed



in connection with a map or chart we have at once a position finder; this is the case, whether we employ a short base as a multiplier for one of the trigonometrical functions of the angle subtended by it, and plot the result in the proper direction on the map, or whether we make use of the intersection of lines drawn from the extremities of a long base directly on the map.

32. Both systems have their advantages and disadvantages. In the former, two men within speaking distance of each other make simultaneous observations; they can insure that each is observing the same target; the observations may be made by one man only if the target is not in motion, or when its angle of depression on water can be observed.

The disadvantages are that the accuracy of the range found depends on the mechanical accuracy of an instrument designed to measure very small angles, and therefore delicate and easily put out of adjustment. When the base is short a very slight inaccuracy in the observed angle will render the range found useless even as a guide.

It is also impossible to use the same base to obtain the ranges of a number of dispersed targets, or when the target moves through many degrees across the front of the observer, without introducing great complications.

In the latter system any simple arrangement with protractors and threads can be made to answer, and the result obtained in this rough manner cannot be beaten for accuracy by the most complicated mechanism; the disadvantages are, that owing to the distance apart of the observers, there may be difficulty in insuring that each observes the same target. It is also necessary to rapidly communicate the angles observed to where they are plotted on the chart; in fact, the intersections should be made automatically on the chart, as, for instance, by straight edges crossing one another, or some such device; and here we are almost necessarily committed to electric connections and a plurality of wires.

One thing, however, is pretty certain, it is not desirable to have observing stations close to guns. Guns will necessarily draw fire on themselves, and the observing stations will, therefore, if close by, come in for their share. Moreover, the view of the observer may be interfered with by the smoke of his own guns.

33. Which of the two systems is the better can best be determined by considering what is required of range and position finders, respectively.

As already stated, we require a range finder to determine the range of a target as a basis on which to calculate the angle of elevation. A position finder, however, has to determine not only the range of the target, but also the angle in azimuth at which the piece has to be laid.

When a gun is laid by direct vision it does not much matter if the range finder gives the range slightly longer or shorter than the true ranges, so long as it does so consistently and in proportion.

The shooting of a gun is affected by such a number of uncertain factors, which have, as a rule, to be lumped together and corrected for, that another small one does not much matter; but when a gun is laid for direction by a position finder this will not answer.

Since the position of the gun is not, as a rule, nearly identical with one of the observing stations, it is evident that an error in the range found may affect both range and direction at the gun.

34. We may conclude, therefore, that when only a range finder is required, the short base system may give sufficiently accurate results, but that for a position finder the long base system is preferable, unless one of the observers can be placed quite close to the gun. The latter system, moreover, is most conveniently used in connection with a map or a chart, though not necessarily so, but as some sort of plane table must be used there is every advantage to be gained by having a chart or map fixed on it.

35. So far we have dealt with the measurement of horizontal angles. On sea fronts, when elevated positions are available for observing stations, very accurate work can be done by measuring the angle of depression to the target on the water below. The height of the observing instrument above the water in this case forms the base. The one essential is sufficient height in proportion to the base to be measured. This method has the great advantage of only requiring one observer, and he can make continuous observations. The disadvantages are that it is very often difficult to distinguish the water line clearly, especially when a ship is firing, whilst some portions of the higher spars are almost always visible; and as this is an objection which cannot well be actually experienced during peace practice, it is important that it should not be forgotten.

All instruments of this kind may be included among short base range finders.

36. In addition to the two great classes already mentioned, we may add acoustic range finders and optical range finders. There are also instruments which measure the angles subtended by the height or breadth of the target itself, whether this be a man standing or on horseback, or an object of suppositiously known dimensions. They have the advantage that only one observer is necessary, but as the base consists of some dimensions of the target itself which cannot be depended upon as constant, such instruments cannot be in any way reliable.

Acoustic range finders depend upon the time taken by sound to traverse the distance required to be measured. The velocity of sound, however, depends upon a great many uncertain factors, and the instruments have been out of favor for some time.

If a telescope could be constructed so that the mere fact of focusing the objective was sufficient to record the range, we should have attained the ideal instrument. Such an instrument is, however, still in the ideal stage.

37. We have nothing, therefore, to fall back upon but either to measure the distance directly on a map when the position of the target can be localized, or to use either a long or a short base range finder. The use of a long base instrument is very much the same thing as the use of a map alone, the intersection of lines or straight edges giving the position of the target instead of localizing it by mere observation.

38. Short base range finders depend on the mathematical accuracy of

their construction, and, in the first place, it is necessary that they should measure angles correctly. There is no particular difficulty in producing instruments that will do this, whether we depend on the instruments constructed on the principle of the sextant, or use a prism ground to a given angle; but the difficulties begin when the cosecant or cotangent or some other function of the angle subtended by the base at the target is used as a multiplier to obtain the range. Micrometer screws, sliding fulcrums, and such like devices are used in some instruments; in others the resistance offered by a wire to the passage of an electric current is made use of, and errors may creep in through loss of time and wear. Besides this, it is possible that errors may arise through the instrument not being founded on an accurate mathematical conception; or, again, the mathematical conception may be right enough, but it may be impossible to devise an instrument which will carry it out satisfactorily in the face of even very slight wear. Too much stress has perhaps been laid on this point, but it has been done with the intention of showing how very desirable it is that in all range finders as long a base as possible should be used.

39. Extreme portability is of course a great desideratum in range finders for use in the field. When we come to those for fortress, coast, and naval use we have rather different data to go upon. In these cases such extreme portability is not of much importance, and there is time to prepare such accessories as electric or telephonic communications between the observers, and from them to the battery or batteries served; thus a much greater extent of base can be utilized. On the other hand, there is not much choice of position for a base; we must therefore, be prepared to use one at any degree of inclination to the direction of the target.

40. Up to the present time no range finding instrument has stood the test of actual service on a large scale. Instruments have certainly been used in small expeditions, but in a more or less half-hearted manner, more as an experiment in fact, than as a necessary part of service equipment, and the results have certainly not been very encouraging.

The generally accepted principle has been for the artillery to find the range by trial shots, the infantry obtaining their ranges from them when possible. It would be obviously impossible for the latter to see the impact of their bullets except at very short distance.

From the considerations already discussed we see that knowledge of the actual range is only useful as a basis for calculation, and that practically we must still depend on one or more trial shots to determine the necessary data but that when once these data have been determined we may, should it be necessary to fire at a different range, dispense with the preliminary trial shots and predict the shooting of the gun with a certain amount of confidence.

In fact we require from a range finder not the actual range of the target in yards, but the elevation necessary to make the shot range up to the target under the then existing conditions.

41. Even were we in possession of an ideally perfect range finder it would not be possible to carry on blindfold practice; the shooting must constantly be watched and the elevation corrected when necessary.

42. This constant watching is more necessary in the case of artillery than in the case of infantry fire; the projectiles of the former being fewer in number it is more necessary to be very careful that none are wasted.

If long-range infantry fire is to be effective, an enormous expenditure of ammunition must necessarily be calculated on, and inaccuracy must be compensated for by volume; but even in this case, when the beaten zone may be taken at 400 or 500 yards deep, it will be necessary to recognize the correct range of the target, though the refinements which are necessary for good artillery practice may be out of place.

43. It is generally considered that high-angle fire from concealed batteries will be a feature of future wars, and in this case some sort of position finder is a *sine qua non*.

These considerations have brought range finding into prominence once more; for field service they are once more on their trial. In the attack and defense of fortresses, and especially in coast defense, they have for some time held an established position; for naval use they have also been brought forward lately.

44. Having broadly dealt with various kinds of range and position finders and the necessities of gunnery under modern conditions, it becomes possible to divide the subject into different headings in its application to: (1) Land fortresses; (2) Coast defense; (3) Service in the field; (4) Naval use; and to consider the requirements of each separately.

45. The land fortress of modern days is generally of the nature of an intrenched camp surrounded by detached forts. The modern tendency is not to place guns in these forts in any number, if at all; their defense against close attack is purely by musketry fire, and they are intended to act as keeps for the defense against infantry attack of the attached batteries placed under their wing.

The main artillery defense consists of these attached batteries and of others improvised, when the direction of the attack has declared itself.

A large number of the ordnance told off to fortresses nowadays consists of howitzers, and these are best laid by means of some sort of position finder; the guns for direct fire will require a range finder, and a position finder will be wanted in many cases.

46. Very few cases will occur when a good large scale map of the country round is not available, and it may be possible to fix the position of any objective on the map by mere observation from an elevated lookout station, or captive balloon; if so, no range-finding instrument is required.

47. A ready reckoner as mentioned in articles 18, 19, 20, and 21 is desirable, and also a rapid means of conveying orders to the battery; for it may be taken as certain that the observing stations should not be close to the battery, for, as it has already been pointed out, one will draw fire on the other, and there is a possibility of the interference of smoke (this matter will be discussed further on under the heading of Observing Stations).

In the case of concealed batteries for high-angle fire, the observing station must almost necessarily be at a distance.

48. We have to consider practically two different kinds of country.

First, when it is intersected, or of such a nature that an objective can readily be localized on a chart; and secondly, when the country is of a featureless nature, and it is not easy to do so.

In the first case a long-base range finder would be unsuitable, as it would often occur that observers at a distance from one another might be unable to see the target simultaneously, and thus if a range finder were to be used it must necessarily be a short base one; but, on the hypothesis the position of the target can be localized by mere observation, and thus a range finder becomes unnecessary.

In the second case some sort of range finder is necessary, and which kind is the best can be determined by the considerations noted in articles 32, 33, and 34.

49. As high-angle fire is a very considerable feature in fortress warfare, the long-base system as being most applicable to position finding will probably be considered the best. It would probably be worth while considering whether the ground in front of batteries for direct fire or defensive works can be overlooked from them so as to allow of portable short-base range finders being worked in direct connection with the units to which they are attached.

50. The possibility or otherwise of getting electric communication between the observing stations and batteries must also be considered.

51. To avoid working in the dark it will be as well to state here the ideal that is aimed at:

It is desirable that the greater number of the ordnance told off to a fortress should not be kept permanently mounted in works. They should be kept in store in a central position. Plans would of course be prepared for a variety of eventualities, and it is very important that the plans should be kept secret. Once a battery is built persons will not be wanting who will betray its locality to any possible enemy, and it may be considered certain that the position of any forts, batteries, or observing stations built during peace time will be known to an enemy.

52. A certain amount of preparation in the way of permanent works is of course necessary, so as to give backbone to a line of defense and prevent the possibility of a *coup de main*; and roads, tramways, etc., will be prepared, so as to allow of other works being rapidly thrown up and armed when the occasion arises. Beyond this nothing is required but plans worked out and elaborated so as to meet every contingency, and the garrison, ammunition, and stores kept in the highest state of efficiency.

53. A fort or battery placed on a hill cannot be hid, and even when it is not placed in such an obtrusive position it can be hit by artillery fire, provided its position is known and localized on the map, and the high explosive shells which will be used in the next great war may be expected to make it untenable.

54. The obvious remedy is to place the guns in temporary positions where they are covered from the direct view of the enemy's gunners and as far as possible from his observers in balloons. This entails the use of some sort of position finder. The positions of these guns will, no doubt, be localized by the enemy sooner or later. Their position can hardly be concealed

from observation by balloonists, and when discovered it may be necessary to shift the guns to another position.

55. Ordnance mounted on railway trucks would be admirably adapted for this sort of work, and it follows that the position finders, by which their fire is to be directed, must be of a very universally adaptable nature.

56. They should be portable, capable of being taken out of store and set up anywhere at a moment's notice. Should the position of the observer or observers become untenable, owing to the enemy's fire, it should be possible to shift the instruments and start them working again with but little delay. Again should it be necessary to shift the guns, it should be possible for the position finder to direct the fire in their new position without moving the observing instruments themselves.

57. As the greatest effect is to be obtained by concentrating the fire of scattered batteries or guns on one objective, and as it would probably be impossible and, if possible, might be undesirable to have a separate set of observers for each battery or gun, it should be possible for one or two observers (according to the nature of the instrument used) to direct the concentrated fire of a number of scattered guns on any given target. We may almost aim at the ideal of the whole of the guns of a fortress being directed by an observer in a captive balloon.

58. It will be seen that magnificent possibilities are open to whichever side is best able to avail itself of the principles of position finding.

59. Position finding, moreover, is not a very intricate matter; the great essential is an accurate large scale map of the country round the fortress, kept carefully up to date.

When it is possible to fix the position of targets by simple observation, as from a balloon, it will only be necessary to have in addition a calculating machine of the nature referred to in Art. 18, *et seq.*

60. When it is not possible to do so, a position finder must be applied to the map, and since the long base system lends itself more readily to these conditions, and is besides more reliable in every way, we may take it that this system will be the best for the direction of high angle artillery fire, whilst for direct artillery fire and musketry a short base range finder will probably meet the case.

61. In a fortress warfare the main object for artillery is to prevent the enemy establishing himself and his batteries within range of the place. Until this has been done there is not much likelihood of an attack in force by infantry. Still, it is advisable to be prepared, and if the fire of howitzers in covered positions can be efficiently directed on a moving target, such as is afforded by an infantry attack, it is evident that great advantages will accrue to the defense. It may also be possible to direct high angle fire on such deep targets as are presented by troops advancing along roads.

This portion of the subject, however, more properly comes under the heading of "Service in the Field," and will be taken later on.

62. Position finding in coast defense presents somewhat different conditions. The surface of the sea is featureless, except so far as buoys or beacons may denote a navigable passage, and even these would probably be removed in war time. It is in most cases impossible to localize a target by mere ob-



servation. A position finder is essential when the target is not visible to the gun layer. When the target is visible a range finder can be made to do the work.

Coast defense has generally to do with more or less intricate channels, portions of which may be defended by submarine mines or other obstructions. As a rule, attacking ships will not have much choice of direction in attack, and it will be very advantageous if the position of these ships can at all times be fixed on a chart of the harbor by means of a position finder.

Guns can only be fired about once every three minutes, and it is necessary to determine beforehand a point in the future probable course of the ship, so as to insure that the gun shall be laid correctly. If the officer directing the fire can have in front of him a chart with the position of the ship continuously indicated upon it, his duties will be considerably facilitated.

63. By marking on the chart the position of the ship at given intervals of time, he can at once see the course steered and the speed; the soundings on the chart will enable him to predict with accuracy the ship's future course, and the position she may be expected to have arrived at when his guns are ready to fire.

64. The advantages thus gained are so great that it is advisable to make use of a position finder even when the target can be seen from the guns; its use will make the battery independent of smoke from neighboring guns, which may occasionally obscure the range, and of darkness, or of being dazzled by the enemy's search lights.

65. Position finding also allows of the concentration of fire of scattered batteries, and of their control being under the hand of one commander.

66. As an ideal, let us imagine a number of scattered batteries surrounding an anchorage and its approaches; that these batteries, when not absolutely covered, are at least carefully screened and assimilated as far as possible to the landscape; also that the fire of these batteries can be either directed onto separate targets or concentrated onto a single objective.

Observing stations should not be close to guns, for if one or the other were discovered fire would be drawn on both; it is advisable that the positions of these observing stations should not be shown in peace time by having elaborate emplacements of iron and concrete built for them. The emplacement of heavy guns must necessarily be permanent, but those for observers should not be marked ostentatiously, though they would, of course, be selected beforehand, every advantage being taken of the concealment offered by banks, hedges, etc.

67. An easily adaptable instrument, such as was suggested in article 56, would be the most suitable. Whether a long base or a depression instrument should be employed would depend on whether there is any high ground available to put it on. The depression instrument is *prima facie* the most simple, as one observer is sufficient, but it is not so easily applied to a chart as is the long base instrument; moreover a very stable foundation is wanted for depression instruments, and this almost necessarily entails a permanent emplacement. Other disadvantages are mentioned in article 35, and there is the further disadvantage that where the concentration of fire of scattered



batteries by means of a single instrument is aimed at, any small error in the angle of depression measured will entail an error in range at the position finder and that this may react in a different manner at each of the batteries, making in some an error of range, in others an error in direction, and sometimes in making a combination of both errors.

This consideration applies equally to all short-base position finders, whether horizontal or depression.

68. It is obvious that coast forts and fortresses are more open to unexpected raids than is the case with land forts. With the latter a regular siege is a long affair, demanding considerable time, though of course, they should be prepared against a *coup de main*. With coast forts, however, we may in many cases expect that an attack may be begun and ended in the course of a few hours, the first intelligence of a projected attack being the appearance of the enemy's vessels in the offing.

This though a possible case, is not a very probable one; men of war are nowadays too valuable to be hazarded for a mere raid, but it should be prepared against.

69. If delicate instruments, such as position and range finders, are kept constantly *in situ* they must necessarily deteriorate, and this is the case whether they are actually covered or not. It is impossible to keep a number of small covered lookout stations properly dry, and if it were possible to do so the instruments could not be properly looked after in their scattered positions. The alternative is to keep them in an easily accessible store where they can be constantly tested and examined.

70. But these arguments do not apply to the electric communications. There can be no objection to having the cables laid ready. The ideal system would be to have a sort of exchange system—an exchange room permanently fitted up with switchboard, etc., in some sheltered and central position. Cables would be laid permanently from the exchange to the batteries and to the observing stations in such a manner that any observing station could be switched onto any battery; in fact that any desired combination could be arranged. Such an arrangement would seem to entail permanent observing stations, but this is not the case. It could be easily arranged to tap one of these cables wherever it was desired to set up an instrument. A short length of overground wire might be necessary in some cases and would not be objectionable. There need, therefore, be nothing above the ground to show the proposed positions of observing stations. Though certain positions would, of course, be secretly arranged for, and instruments could be set up in these positions whenever they were required for service or practice, at other times there would be nothing to betray their locality.

71. If a defensive position is taken up along a line of heights, and the troops and guns are distributed along them so as to sweep the ground in front by direct fire (whether musketry or artillery), it follows that both guns and men are exposed to the direct fire of the enemy, and as the defender is as a rule in inferior force it is probable that sooner or later the guns of the defense will be more or less silenced and the infantry shaken and demoralized by the fire of the attacking artillery.

72. If, however, the line could be strongly posted on the reverse slope, or even some distance back, as in the case of a plateau, and within effective musketry range of the summit or crest line (say, 400 to 500 yards from it), a very different aspect would be obtained.

If the attack proposed to use their artillery at all, they would have to bring them into action on the top of the hill or crest of the plateau, to establish them there and systematically open fire while exposed themselves to the artillery and infantry fire of unbroken troops; and to do this the experience of actual war has shown to be very difficult. On the other hand, by thus withdrawing the shooting line from the crest we entirely abandon one of the great advantages of the defensive—long range fire on the attacking troops during their advance, to which fire they are practically debarred from replying by the mere fact that they must get forward. We also allow them to get within easy striking distance at their leisure, to say nothing of the bad moral effect on the defending troops, so that when we have only direct fire to depend upon we are on the horns of a dilemma.

Position finding will relieve us of this difficulty provided it can be applied in a satisfactory manner.

73. In the field we must give up all ideas of having electric communications between distant observing stations on the same scale which is possible in fortresses, and so only two methods of position finding remain. Simple observation combined with the use of a map, or a short base range finder, either with or without a map.

Electric cables containing several wires being impracticable, we must arrange to have the instruments as close as possible alongside the unit they serve. This consideration will generally entail the use of a captive balloon or other elevated position for an observing station. And since the use of a range finder from a captive balloon would be very difficult, if not impossible, we shall have to fall back on simple observation and the map in this case.

74. Telephone wires can be laid very quickly, and are not heavy, and there is no reason why the fire of guns in the main covered position should not be directed from observing stations in the outpost line. In this case the use of a range finder would be possible, and the observing stations could be hidden.

75. The foregoing considerations apply to the attack as well as to the defensive. The latter, however, may be expected to derive the greatest advantage from position finding, since they should have the opportunity of studying the ground to some extent at any rate before they are attacked. They should be able to establish their batteries and observing stations at leisure, while the attack, should they wish to follow the same methods, will have to do so under fire.

76. In the position finders for fortresses we have seen that elevation and direction should be indicated automatically at the gun, and this necessitates a certain amount of wires in the cables connecting the observing station or stations and the battery. The advantages gained by having the indications made mechanically are so great as compared with orders transmitted through a telephone that the extra complication and expense would be well

repaid. On field service, however, complications of any kind would be out of place, and we must have recourse to the telephone.

77. The method followed at each observing station would be: The position of the battery and of its observing station would be fixed on a map or plane table, also the position of a distant object to serve as an auxiliary mark, by reference to which the guns can be laid for direction. If then the position of the attacking troops can be fixed on the map (as already discussed), there is no difficulty in obtaining all the data necessary to enable the guns to be laid on them, and these directions are transmitted to the battery by the telephone.

A calculating machine, as already referred to, is desirable, but not absolutely necessary, and beyond this nothing is required but a good map, a contoured one if possible, and failing which, a clinometer will be wanted and used in connection with a range finder to determine the quadrant elevation.

78. Now, this system is as easily applied to high velocity guns with a flat trajectory, such as modern field guns, as it is to mortars and howitzers with a high trajectory; but we must remember in the former case that natural features of small altitude may interfere with the path of a shell which, in the latter case, would pass high above them. And to avoid wasting ammunition, as well as for other reasons, it will be necessary to have some means of rapidly determining if any given features will become obstacles in the trajectory.

79. When the gun and target are on the same level it is only necessary to know the height of the trajectory above this level at any particular point, and this can be easily, if somewhat roughly, determined by a reference to the range table of the gun, thus: Distance of target, say, 3500 yards; distance of hill or other obstruction, say, 800 yards.

From the range table the normal time of flight to 3500 yards is, say, 10 seconds, and to 800 yards 1.65 seconds. Call the former *T* and the latter *t*.

Thus the height of the trajectory in feet at a point 800 yards from the gun is:

$\frac{1}{2} g t (T-t)$ .—Taking *g* at 32 f. s.—=220 feet, nearly, by an empirical formula. So that if the obstacle does not rise higher than, say, 200 feet above the level of the gun and target it will not interfere with the trajectory.

The gun, however, may not shoot up to the normal range table. Any excess of elevation given on this account may be looked upon as a factor of safety for the obstruction, and as guns hardly ever shoot beyond the normal range table this is all that need be considered.

80. When the gun and target are at different elevations, we have to consider the lie of the ground, buildings, woods, etc., with reference to a line drawn directly from the gun to the target, and not with reference to a horizontal plane.

In all practical cases we may consider that the trajectory is rigid, *i. e.*, supposing we know the elevation necessary to make a projectile range up to the target at any given distance on the same level as the gun, we have only

to measure the angle of depression or elevation of another target at an equal distance, but below or above the level of the gun, as the case may be, and either subtract or add this angle to the tangent elevation, and we shall thus obtain the correct quadrant elevation.

81. The formula given in Article 79 can now be applied, taking into consideration that when the gun is higher than the target an object on the same level as the gun, or even below it, may be equivalent to an eminence in interfering with the trajectory of the projectile, and this will depend on whether it recurs within the first or second half of the range.

82. A very simple graphical method can be adopted to determine whether there is any interference or not, but it cannot well be explained except practically.

This graphical method will also serve to find out how best to cover the slopes of a hillside with grazing shell-fire, the most deadly of all.

The following process might be adopted :

On taking up a defensive position, existing maps of the ground would be corrected and contoured, and the most important zones to be covered by artillery fire determined by comparing the contoured plan of the ground with the trajectory for the gun to be employed in the defense. The best position for the battery would be fixed so as to cover the important points with a grazing fire without neglecting other points or endangering their own infantry through premature bursts. Of course if mortar or howitzer batteries were available there would be much greater latitude in choice of position than would be the case with batteries of high velocity field guns.

83. A number of ranges would be taken either by direct measurement on the map or otherwise, and angles of depression or elevation noted so that there would be as little clerical work as possible for the observers when the actual attack came ; in fact a rehearsal would not be amiss, and if there is time to throw up elaborate field-works and shelter trenches for the defense of a position there must surely be time enough for this much preparation.

When noting angles of elevation for the guns and the setting of time fuses, account would be taken of the recent performances of guns and ammunition in these respects, and when time for action came the observer would only have to transmit by telephone a series of more or less preconcerted orders.

Somewhat similar tactics might be adopted if attacking a position the difficulties, however, would be much greater.

## THE WAR BETWEEN CHINA AND JAPAN.

BY COLONEL MAURICE, C. B., R. A.

*From the United Service Magazine, London.*

SHANGHAI has busily confused the story of the war by furnishing us, as it did during the earlier period, with lies produced by the imaginations of panic-stricken officials, or by the desire to create panic of Japanese local agents. We have had landings announced as taking place within eighty miles of Peking, at Taku, and at Shan-hai-kuan, where the great wall ends. It is as certain as anything can be that no such landing will take place at this time of year. Indeed we ought in a very short time, now, to hear that that whole coast is icebound. I do not think it is difficult to separate truth from falsehood, and for practical purposes, so far to determine the course of the war as it has happened, as to enable us to judge of its future prospects. The only map that I have found to be of any use in following these operations is the four-sheet map of Northeast China produced last year by Waeber, and now sold by Stanford. Naturally, many of the villages and small towns referred to could not be marked on any map which would give us within reasonable space a general survey of so vast a region, nevertheless, enough is given to enable us to follow the general scope of the operations; to judge whereabouts the troops are, and to estimate the progress that has been made. I show on the attached sketch sufficient names to make intelligible an account of the sequence of events as I understand it.

I take first the operations of the second Japanese Army because a remarkable blunder which was made in the Shanghai rumors will illustrate the kind of way in which it is necessary to discount the statements from that quarter. It will be remembered then that the Japanese 2d Army landed north of Talienwan Bay on October 24th and on November 6th captured Kinchou and the forts at Talienwan. On November 24th they captured Port Arthur. A considerable Chinese garrison remained, however, at "Fu," a fort on the direct northern road along the coast towards Kai-phing and Niuchuang. On December 2d a brigade under General Nogi sailed from Kinchou Bay near the fort at the narrow isthmus immediately north of Port Arthur, and landing in Fuchow Bay moved to attack the above-named fort at Fu, which was abandoned before their arrival. Fu is only about forty miles from Kinchou and easily accessible by sea, a very different thing from a land march. This incident, duly reported in Shanghai, was immediately magnified into a report of the landing of a Japanese expedition in the extreme northwest corner of the Liaotung Gulf at the important town of Kinchou, a very different place from the fort guarding the neck of the Lao-thie-Shan Promontory on which Port Arthur is situated. As late as December 13th we had pretty definite news from Japan to the effect that the main body of the Japanese 2d Army was still in the neighborhood of the Kinchou fort, while the advance brigade under General Nogi was pushing on along the coast road after the capture of Fu. He



would have about fifty miles to move on Kaf-phing, and about thirty more to get to Niuchuang. Evidently his is an advanced body pushed forward to press the Chinese as long as they retreat, to obtain information and to open up communications with the 1st Army. The advance of the main body of the 2d Army must depend on food and roads. It is difficult to ascertain how much serious work had been done before the war by the Chinese on the line of railway which they were supposed to be carrying out between Port Arthur and Niuchuang. It will be remembered that the Japanese captured in Port Arthur large quantities of steel rails prepared for this work. If the roadway had been at all made ready for their reception it ought to facilitate the march of the 2d Army and might make it worth their while to complete the line with a view to future operations. There is certainly no sign on that side of anything that portends a winter march on Pekin, and the statement from Shanghai that the "two Japanese armies already north of Niuchuang" are marching on Pekin is a mere panic-stricken lie.

To turn to the 1st Army. On October 24th, that army forced the passage of the Yalu, and captured a position occupied by a portion of the Chinese army to the east of the Ai. Having the following day crossed the Ai, they, on the 26th, made a general advance on Hiu Lien Tchong, from which the Chinese army retired without fighting, leaving 22 guns, 300 tents, ammunition, grain, and forage to their enemies. Throughout these operations Maj.-Gen. Tachimi's force occupied the extreme right, Maj. Gen. Osako's the extreme left. The position of Feng Huang Tchen is said to be the most formidable in Manchuria, and the Japanese seem to have taken some time to move forward the thirty-five miles between Antung, where they now established their headquarters, and Feng huang Tchong. It is evident that they received some check, but its exact gravity and nature is not easily ascertained. In any case ultimately they occupied Feng huang Tchong, and from there pushed out advanced detachments in various directions.

On the right General Tachimi moved towards the Mothien Pass, leaving apparently the main road which passes by the Lien Shan Pass to a central column. His detachments appear to have been considerably in advance of any of the rest of the army, probably because the chief Chinese resistance was made along the main road. In any case, about November 15th, some of his scouting parties, having reached the Mothien Pass, there received a decided check, which was further repeated when the supports came to their assistance on the following day. Evidently the central column and probably the larger part of the army lay between Antung and Feng Huang Tchong. Then ten days later, about November 20th, the troops moving on the central road are reported to have been attacked by a superior body of troops coming from Hing King. To judge by Waeber's map the topography between Hing King and Feng Huang Tchong is very remarkable. The river Pa Tao Ho, which joins the Ai before it falls into the Yalu, rises in the mountains south of Hing King, flowing southwest and then after about two-thirds of its course makes a sharp bend to the southeast. The river Thai tsu Ho rises from near the same place as the Pa Tao Ho and flows northward. It then breaks sharply back towards the west, and thus re-



ceives tributaries from both sides of the mountains. The road from Hing King southward leads along the valley of the upper Thai tsu Ho and of the Patao Ho. Without any other design than that of moving down into the fighting region it would inevitably follow that General Li and his forces marching by this line would break in at right angles to the march of the right wing and centre of the Japanese army. The results that have happened were just what we might have expected; all the detachments of these forces were brought tumbling back, and, till General Li's army had been disposed of, all the serious fighting of the right and centre up to Friday, December 14th, had been within five miles of Feng Huang Tcheng, that is about forty miles from the point at which the Japanese crossed the Yalu on October 24th.

Now as to the left wing under Katsura. Some time before November 15th the left brigade under General Osako arrived at Ta-ku-shan, the point where the Chinese reinforcements were in fact landed at the time of the "Yalu" battle. It appears that this is the nearest point along the coast to the Yalu mouth, where a landing can safely be made, the precipitous hills of the Yalu making the operation too difficult. Presumably, though we have not been expressly told so, General Osako's brigade was taken to Ta-ku-shan by water. It would no doubt be easy enough to embark his men at Antung, now in the hands of the Japanese. The object of his expedition was to move up the valley of the Siao Yang Ho on Siu Yen, to turn the Chinese out of that point and to establish connection between the 2d Army in the Port Arthur Peninsula and the 1st Army in Southern Manchuria. Apparently the very active correspondent of the *Central News* went with this column, for we have a letter dated from Siu Yen on November 18th speaking of it as then just occupied. For a long time silence fell over this column. The Japanese headquarters were as little aware of its doings as we were in Europe. All that was known of it was that the field telegraph wires, on which, as I have so often pointed out, it is clear that the Japanese must be relying for the working of their campaign, had been cut, apparently repeatedly.

At length we get news of it up to December 13th. After unavoidably slow marches it was successful in clearing out the Chinese troops out of a large section of the country, and fought an action at Si-Mu-Tcheng, apparently about twenty miles south of Hai-Tcheng. Just before the fight it effected its junction with the remainder of the left division, under Lieut.-General Katsura. The now united wing, after the action at Si-Mu-Tcheng, pushed on rapidly to Hai-Tcheng, and defeated the Chinese force there on December 13th. No doubt they have since captured, or will immediately capture, Niuchuang. This is the force which has been magnified by Shanghai terror into 76,000 men, and the united force of the two Japanese armies. It consists, in fact, solely of the left wing of the 1st Army. I should put it at most at about 8000 men. Far more important, however, in determining its future movements, is the fact that even if, which is possible, an army of that strength be sufficient to capture Peking, it cannot advance without arrangements for the supply of ammunition and food. A large expenditure of ammunition must be calculated upon. A force pushed on as

this has been cannot be yet ready for that. The bulk of both Japanese armies is far in rear. I cannot see that there is the least indication that for some time yet to come the Japanese will be able to do more than establish order in Southern Manchuria. It is evident that they have their work cut out for them even in doing that. With Korea only half absorbed and much fighting still going on in Manchuria all these talks about a march to Peking during the winter seem to me idle tales. I cannot see that the game is worth the candle, or that the Japanese commanders are likely to think it so. I should say that Peking is to all intents and purposes a certain conquest for them by a landing and a direct march as soon as the weather is favorable next spring. I feel confident that they intend not to finish the war till they are under the walls of Peking. But that the best way to get there is that of making a long and most dangerous march at this time of year I cannot believe. It is to be noticed that, as I last month suggested must be done, the Japanese are importing large quantities of hutting material, so as to have safe places for the great body of their troops during the winter. The smaller detachments that are scouring the country can no doubt get accommodation easily enough. I hardly see how they can go much farther till they have secured themselves from the danger of fresh forces poured down from Hing King and Mukden on their line of supply. No doubt if they could so improve the communication between Port Arthur and Niuchuang as to depend on that line alone for what they want, the movement would be pretty safe, because that road would be unassailable almost as far as Niuchuang.

The *Pall Mall Gazette* recently published a letter from an English correspondent, who had been inspecting the Chinese ships in Port Arthur, and interviewing a number of Japanese officers. Incidentally he brought out the fact that great part of the destruction on board the ships was due to the employment by the Japanese of what he calls "Mellanite shells." Whether the actual composition used was the same as Mellanite may perhaps be doubtful, but that the Japanese most successfully employed some form of high explosive there can, I think, be no doubt. Yet we never heard of it till months after the battle, then quite casually, as if it was of no importance, and not one paper in the kingdom has taken the least notice of the matter, or seems to realize what it means. If this has been so quietly managed at sea, why may not the same thing have taken place on land? May not the extraordinary ease with which the Japanese seem to have swept away the Chinese intrenchments have been due to the action of high explosives? It is a big question. Whoever has correspondents in the East would do their country a good turn by finding out all they can about it.

#### FOREIGN OPINION.

*From the Army and Navy Gazette.*

A retired officer of the French army, living at Yokohama, has transmitted to the *France Militaire* some facts which he has gathered from a Japanese officer who was wounded at Ping-Yang. The opinion of the Mikado's officer serves to confirm the opinion as to the deplorable conduct and demoralization of the Chinese which was given in the long letter of

an educated and travelled Chinaman, published in our columns last week. The successive defeats of the Chinese, we are told, are due to their defective armament and the rudimentary state of their military organization: "Imagine an extraordinary crowd of badly-clothed men carrying strange arms, fit for a pantomime or a museum of curiosities. At Ping-Yang most of the Chinese could not use their rifles, and in despair threw themselves upon us with spears. But these acts of bravery were the exception. In the earlier combats I witnessed the wildest panics, the Chinese throwing down their useless weapons and flying, in spite of their chiefs, who endeavored to keep them to their duties. In truth, the Chinese army has long formed but an assemblage of badly-fed, never-paid, utterly demoralized troops, veritable hordes of brigands, who pillage and burn everything upon their passage. Thus it was that the natives received us everywhere as deliverers. You can have no idea of the acts of barbarism and the atrocities we have seen. How many times upon entering poor villages have we seen ears and noses nailed upon doors by these bandits, who have thus avenged themselves upon their compatriots who have denied something to their greed!" The Japanese officer avers that when the rain fell heavily at Ping-Yang, the Chinese put up their umbrellas: "Gen. Yeh carried the pleasantries so far that he sent a white flag to us demanding a cessation of hostilities because of the bad weather." The Japanese officer, however, bestows high praise upon the Chinese cavalry: "At Ping-Yang the Manchu cavalry gave proof of extraordinary bravery. In order to cover the retreat they attacked the brigade of Gen. Nodzu, to which I belonged, and were driven back by a murderous fire, but returning to the charge without success, 750 horsemen were slain before our eyes. It is certain that if the infantry had shown as much courage, we should not now have been upon the road to Peking."

The *Deutsche Heeres-Zeitung* believes that the Japanese have yet a very difficult task before them. After six months of war they are not yet at the point at which the operations of France and England began in 1860. The Taku forts are not yet taken, and fall they must if Peking is to be attained. Nor can it be a mere promenade from Taku to Peking; and the road between the two must be kept open at all costs, for which purpose almost the whole Japanese army would be required, since the Chinese have time to strengthen their position and reinforce their troops before the capital. Such are the difficulties, says the *Heeres-Zeitung*, that the Japanese themselves seem to have little taste for the venture.

#### MOVEMENTS OF THE TROOPS.

The division of the Second Army, under Lieut.-Gen. Baron Yamagi, entered Kai-Chou (Kai-Phing) on the 18th inst. without resistance. On the 17th and 18th inst. the scouts of Gen. Katsura's division brought word to him at Liao-Yang of the flight of Gen. Sung's army northwards after being defeated at Hai-Tcheng. On the night of the 18th the Chinese army was ascertained to be passing within a few miles of the Japanese camp. The enemy's numbers were estimated at 10,000 men of all arms. Gen. Katsura, therefore, moved against them with his full strength. The Chinese were

overtaken on the morning of the 19th. Major-Gen. Osako's brigade was the first to be engaged. The enemy made a stand at the village of Kungwasai, about eight miles from Hai-Tcheng, and severe fighting ensued. While this was proceeding, Major-Gen. Oshima's brigade, coming from Hai-Tcheng, entered the field and joined hands with Osako. The combined force consisted of four complete regiments and five batteries of artillery, besides troops of other arms. The Japanese artillery, which was well placed, played havoc with the Chinese, who stubbornly stood their ground. The Japanese infantry charged splendidly and cut their way through the Chinese army, but the enemy rallied and fired steadily. Thrice the Japanese repeated this movement, dashing right through the enemy's lines. Desperate hand-to-hand fighting took place. After five hours' fighting the Chinese began to falter, and soon they were in full and disorderly flight, some westward, others northward in the direction of Yingkow. The Japanese occupied the village of Kungwasai. The Chinese lost probably 500 killed and wounded. The Japanese suffered severely, but the actual figures have not yet been received. As a result of this defeat Gen. Sung's army fell back upon Newchwang, and afterwards retreated to Denshodai, together with the mass of the troops stationed at Newchwang. Gen. Katsura now reports that there are no Chinese troops at the latter place. The Chinese forces at Naisanbarsi have been occupied since the 18th inst. in extending the front of the Chinese lines. They are also increasing the number of their banner cavalry. Japanese scouts sent in the direction of Po-Chi report that about 8000 Chinese are advancing from Cilco along the sea-shore.

Although information concerning the Japanese operations is scanty, there seems to be a probability that General Nodzu has met with unexpected difficulty at the Mo-Thien-Ling Pass. A large force from Count Oyama's army, having returned from Port Arthur upon Kinchow, has marched northward and occupied Foochow, upon the eastern shore of Liao-Tung Gulf. Here it is probably intended to establish a base for operations across the bay, and General Nodzu has detached a force under Major-General Tashima to join hands with Count Oyama's troops in the vicinity. From Foochow it will be possible to turn the Chinese flank at the Mo-Thien-Ling Pass, and thus to secure the approach to Moukden or to advance upon Newchwang. The Japanese fleet is supreme at sea, and every preparation is being made to carry on the campaign with vigor. In relation to the probability of a winter campaign we note that Major Milnes, who left in the *Crescent* with a detachment of marines for the Australian station, has been placed in charge of a guard for the British Embassy at Peking.

In Manchuria the advance of the Japanese is slow. Remembering the hardships which the first army has suffered, and the losses it must have sustained in its long march from Ping-Yang, this is not surprising. General Nodzu, however, has advanced on the Newchwang road to Hai-Tcheng, while the advanced troops under Major-General Nogi, which captured Kaiphing on the 10th, have effected a junction with General Nodzu near Hai-Tcheng. Reinforcements will doubtless be pushed forward, but the strain upon the Japanese must be severe. We do not doubt that they will

make progress, but—unless we believe that the hard frost is to their advantage—they cannot accomplish much before April. An official telegram from Hiroshima reports that the roads are in a bad state and difficult to repair. The Chinese, operating from Newchwang and Ying-Tsu (its port on the Liau-Tung Gulf), are strongly posted, and are in great force. They have just been reinforced by 20,000 troops from the south under General Li, and with the troops at Liau-Yang on their left flank, probably number from 80,000 to 100,000. Of their fighting value, or of the qualities of their commanders, we know practically nothing, but we shall be surprised if they assume a determined offensive.

A further move in the Chino-Japanese struggle was commenced yesterday week (January 18), when three Japanese men-of-war, accompanied by several transports, appeared off Teng-Chow, a town about eighty miles west of Wei-Hai-Wei, and threw ashore a body of troops with field guns. Next day the place was bombarded by the ships and shore party, and captured, the object of the assailants being to cut the telegraph wire which passes through this town from Wei-Hai-Wei and Chefoo to Peking, and to divert attention from descents which were being made elsewhere on the coast. On the morning of the following day (January 20) another Japanese force supposed to number 25,000 men, under General Sakuma, arrived in Yung-Tcheng Bay, an inlet thirty miles east of Wei-Hai-Wei, and without much difficulty effected a landing. Snow was falling, and the weather was very keen, but by the afternoon of Sunday the greater part of the troops, with horses and stores, were ashore, and a second fleet of transports which had arrived from Talien-Wan with the siege train was being unloaded. On Thursday a third force was landed twenty-eight miles to the west of Wei-Hai-Wei in the Ning-Hai inlet, so that from both sides of the peninsula on which the arsenal is situated the place is now threatened, while a Japanese fleet is cruising outside to complete the investment.

As in all their previous attempts, the organization and efficiency exhibited by the Japanese in this fresh enterprise must excite our admiration and interest, but we shall not be too ready to conclude that Wei-Hai-Wei will fall as Port Arthur did. The place is well defended both towards the land and seawards; it contains the best part of the Chinese fleet, the crews of the ships and a picked body of 11,000 troops, while the defense is said to be in European hands. It may be therefore that the hopes expressed by the assailants of being in possession of the arsenal by the end of the month will not be fulfilled. The weak point in the defense is that the town is dominated by a couple of hills, one on the north 900 feet high and another to the south nearly twice this height. The issue of the struggle will be determined by the possession of these hills. Naturally, the Japanese are anxious to take the port both because it contains the fleet, and by holding it they will have complete control with their ships of the approaches to the Gulf of Pechili, and a fresh base for their operations against the capital as soon as the ice breaks up. Meanwhile the armies in Manchuria continue to press on, and General Nodzu, who is now at Hai-Tcheng, seems fully convinced that no real opposition can be offered to his advance on Peking, while the roads being hardened by the frost, the weather rather facilitates operations than

otherwise. At the treaty port of Chefoo European and American blue-jackets have been landed as a precautionary measure.

The interest of the Chino-Japanese struggle is now centred on Wei-Hai-Wei, which is completely invested on the land side, while Admiral Ito, with the whole of the strongest elements in the Japanese fleet, holds undisputed command to seaward. The ships were engaged with the forts last Saturday (January 26) before daybreak, and a heavy bombardment of the place has continued. The policy of the Japanese naval commander, as in the operations at Port Arthur, must be to keep the enemy constantly occupied, while the troops develop their attack on land. When the naval attack was first made a land attack was conducted simultaneously from Ning-Hai, and the last telegrams despatched from Wei-Hai-Wei on Thursday before the telegraph wire was cut asserted that the southern forts and a fort to the east had been carried. It seems certain that a large portion of the defenses have already fallen to the Japanese, and remembering the swiftness with which the assault upon Port Arthur was finally developed, we must be prepared for news of important successes at Wei-Hai-Wei. Rumors have, indeed, been circulated that the place has already been captured, but this news probably needs modification.

The line of defenses extends for some fifteen miles, so that the task of the defenders could not be easy. The greatest interest centres upon the Chinese fleet, but this has so consistently disappointed its former admirers that we have no confidence that it will make an effective fight. A fugitive Chinaman from Liu-Kung Island, off the port, states that the fleet inside consists of eight warships, six gunboats, and eleven torpedo boats. The *Chen-Yuen* and *Ting-Yuen* must now be repaired after the damage they sustained at the Yalu, but the *Lai-Yuen* is said to be still unready. As to the *Ching-Yuen*, the fugitive asserts that the hole knocked in her bottom when she went aground has been filled with cement, and that she cannot fight her heavy guns. The opportunity is great for the employment of torpedo boats, but it seems probable, if Wei-Hai-Wei can be reduced from the landward that the Japanese will prefer to add the captured ships to their fleet rather than to sink them by torpedoes. We shall not be surprised if events develop rapidly, but in any case the progress of hostilities will be watched with the greatest interest.



## Military Notes.

### THE NEW FRENCH REGULATIONS FOR AMMUNITION SUPPLY.

THE question of supplying ammunition during battle is of the utmost importance and receives special attention in all armies. The training in this branch of service is naturally incomplete in time of peace since the serious side of the real combat is lacking. That is no reason, however, why the supplying of ammunition in battle should not be prepared for in peace and special regulations laid down to this end.

It is a matter of opinion whether such regulations are to deal merely with general matters or go into details. The latter view obtains in France, and the instructions for the ammunition supply in the field, dated June 25, 1890, go into details. Though it may be difficult to test the usefulness of such instructions in peace, yet the regulations referred to have been replaced by new ones of Dec. 9, 1893. They were issued to the troops during last May and No. 1923 of *L'Avenir Militaire* discusses the changes made, from which we extract the following:

The new regulations cover 66 pages while those of 1890 covered 49. The most important changes were wrought by the substitution of company ammunition wagons for battalion wagons, as each of the companies has its ammunition wagon with its fighting train.

The changes made may be summarized as follows:

1. The ammunition of the infantry fighting line is divided in that carried by the man, by the company ammunition wagon and the wagons of the infantry ammunition columns.

2. The corps park issues directly to the troops the ammunition they require.

3. The ammunition for the infantry fighting line amounts to 254 rounds per man, of which the latter carries 120 on his person; before the engagement he receives 65 additional cartridges from the company ammunition wagon. Under the regulations of 1890 the total number of cartridges was 204, 112 of which were in the man's pouches, 26 issued from the battalion wagon. Now the infantry man goes into battle with 185 rounds, as against 138 heretofore.

4. Under the regulations of 1890, the ammunition, including that carried in the parks, amounted to 251 per man; the new regulations have increased this number to 303.

5. The company ammunition wagons when full follow in rear of the battalion; the distribution is made before forming for battle. As soon as the wagons are emptied, they move to the rear of the regimental reserve and follow at a considerable distance, not to exceed 1000 metres.



6. During the battle the ammunition sections supply the troops directly by sending forward one ammunition wagon for each battalion as soon as the company ammunition wagons are empty. These ammunition wagons join the regimental reserve, where the commander assigns them to battalions.

7. The ammunition wagons which halt in rear of the battalion reserves, are emptied, and pauses in the battle, a lull in the fight, etc., are utilized for sending cartridges forward to the firing line by men from the reserve.

Of all features of ammunition supply this is the doubtful, chanceful one: the labor of carrying the ammunition is not severe, but to arrive with it is difficult. The regulations suppose that the men return to the point from which they started; that certainly is visionary. When the ammunition carriers reach the firing line, they will remain there, and that is the best they can do.

The regulations require the ammunition of the dead and wounded to be collected. This is practicable behind the rifle trench, in the open field it cannot be depended upon. Any one who participated in 1870 in any battle in the front rank, will confirm this. The only certain supply on which the combatants may depend are, according to *L'Avenir Militaire*, the 120 rounds carried on the person and the 65 derived from the company ammunition wagons. To empty the wagons before the fight, must be the invariable rule. Any other method of supply which compels men and wagons to cross a fire-swept zone for the mere purpose of transporting ammunition, is impracticable, cannot be successful: assistance dependent on so many accidents should not be relied upon.

Lastly one change is mentioned which, however modest it may appear, is of no small importance in view of the pressing situation to which it refers. It is the supply of ammunition during battle. The regulations state: "During battle the commanders of battalions or regiments, of artillery divisions, of company wagon columns, of batteries and, in their absence, the leaders of the fighting echelons acting alone for the time being, are authorized to require and receipt for ammunition. Any requisition for ammunition, in whatever form presented, must be filled at once. This refers to the paragraph on page 24 where it is stated that in cases of emergency the verbal approval of regimental and battalion commanders without further formality is sufficient.

Thus in the preface to the regulations of Dec. 9, 1893, it is stated, that "on the battle-field the requirements of the auditing department must give way to those of battle."—*Militär Wochenblatt*. C. R.

#### WILLSON DISK GUN: DESCRIPTION.

This system of construction is the invention of Mr. Thomas Willson, the electrical engineer, of New York, and the following description is derived from an article by Lieutenant-Commander Ingersoll in the *Proceedings of the United States Naval Institute*.

The tube is of steel of the usual form and characteristics. Around it, for about two-thirds the length, are shrunk thin steel disks of very high-grade steel, prepared by a process of cold rolling which gives an elastic

strength of 100,000 pounds per square inch. In the larger calibres the disks may be extended to the muzzle, if considered desirable. Over the disks and tube, for the full length of the gun, is cast an aluminum-bronze jacket. Aluminum-bronze is selected for the jacket on account of the simplicity of manufacture combined with low cost. But a forged steel jacket, in three pieces locked together, could be substituted. That the casting of the aluminum jacket about the gun will not injure the steel of the disks has been demonstrated experimentally on a small scale. The only effect on the metal is to anneal it. Good aluminum-bronze castings can be had with a guaranteed elastic strength of 30,000 pounds per square inch. The breech-block works in a hoop shrunk on the rear end of the tube and locked and supported by the jacket.—*The United Service.*

#### WOODBIDGE WIRE-WOUND GUN: BURSTING OF.

The fact of the bursting of the Woodbridge, 10-inch, wire-wound gun at Sandy Hook, about a year ago, was not made public for some months. While testing some powder that was to be used in making the official trial of the gun, the tube cracked so badly as to render the gun unserviceable. The charge used was 235 pounds of Du Pont's brown prismatic. The tube apparently lacked support from the wire winding.

This gun "consists of a continuous steel tube, overlaid throughout its rear half with a cylinder of closely-fitted steel staves, the whole wound with tinned steel wire, soldered or brazed in an oven. The whole length of the gun is divided into three sections by steel rings or bands, and forward of the staves the wire is wound directly on the steel tube. It weighs 30 tons; is 27 feet long; the projectile weighs 600 pounds. The staves were annealed at the Washington Navy-Yard. They were 24 feet long, 4 inches square, and weighed 1290 pounds each. The tension of the wire of the Woodbridge gun is adjusted and automatically regulated by a wire-tension apparatus patented by Dr. Woodbridge in 1885. The tensions of winding for the different layers are intended to give, when the interior pressure shall reach a little more than 80,000 pounds per square inch, an extension to the wire overlying the chamber, in all its parts, equal to that due to a tension of 100,000 pounds per square inch in a 'free' wire."—*The United Service.*

#### GERMAN INFANTRY SOLDIER'S EQUIPMENT: REDUCTION IN WEIGHT.

The German military authorities expect to be able to reduce the number of cartridges carried by each man into battle from the present number, 150, to 120, relying upon improvement in the ammunition supply train to provide the remainder as needed. It is said that the French carry 120, the Austrians 100, the Italians 96, and the Russians 84. It is also proposed to carry the day's ration of tinned vegetables in the provision column. It is hoped to lighten the metal parts of the uniform and equipments with aluminum, and the stiff collar of the tunic will be converted into a collar which can be folded down in hot weather, while it can be buttoned up as a protection from cold. A pack of some sort will probably be substituted for the knapsack. It is thus hoped to bring the total weight of clothing and equipment of the German infantryman down from 72.8 pounds to 57.5 pounds. Fur-

thermore, the present bayonet will be superseded by a new model weighing between 400 and 500 grammes less; the belts, etc., will be made of narrower leather; the number of intrenching tools will be reduced to 50 spades, 10 pickaxes, and 5 hatchets per company, which will be carried by the strongest men; and the overcoats will not be so heavily padded as heretofore. Major Scheibert, who served on the Confederate side during the Rebellion, points out in the *Kreuz Zeitung* that no modern campaigns have been so rich in practical lessons upon equipment and supply as those of the American Civil War.—*The United Service*.

PROPORTIONS OF COMMISSIONED GRADES IN U. S. ARMY BELOW THAT OF GENERAL OFFICER.

	Field Officers to Captains.	Field Officers and Captains to Lieutenants.	Captains to Lieutenants.	Remarks.	
				Under operation of law. Years.	Average in cases of last 5 Captains in each regiment. Years
Medical Department..	1 to 1.18	1 to 0.33	1 to 0.6	5	
Ordnance.....	1 to 1.41	1 to 0.3	1 to 0.5	14	
Engineers .....	1 to 0.71	1 to 0.53	1 to 1.27	14	
Cavalry .....	1 to 2.4	1 to 1.53	1 to 2.17		16.1
Infantry .....	1 to 3.33	1 to 1.7	1 to 2.2		18.3
Artillery. . . . .	1 to 2.4	1 to 2.3	1 to 3.25		23.9

NOTE.—Length of service of present first lieutenants.

October, 1894.

	Length of service of the first five lieutenants in each regiment.	Length of service of the senior first lieutenant in each regiment.
Cavalry, average for the 10 regiments .....	15.1 years.	16.2 years.
Infantry, average for the 25 regiments.....	15.5 years.	17.3 years.
Artillery, average for the 5 regiments.....	25.7 years.	26.9 years.

MILITARY PROVISIONING OF PARIS.

A generation ago the art of preserving provisions was in its infancy, and the art of preserving them by means of cold storage was almost unknown. The French Government has taken full advantage of the improvements that have been made in the interval. The military magazines are now always filled, and they are of vast extent. But at the approach of war innumerable warehouses and other buildings, which have been long since told off for the purpose, would be requisitioned and also filled. And the storage of provisions takes up a good deal less room than, probably, most people imagine.

For example, no fewer than 40,000 rations of preserved vegetables can be placed in a cubic space measuring only forty inches each way. Millions of these rations, and of rations of solid soups and preserved meats, are always ready in Paris. The preserved meats, by the way, come from a fac-

tory which was specially founded in New Caledonia to meet the demands of the War Department. The supplies of flour, and of biscuit, are fabulous. During the last siege milk was worth more than its weight in gold, and thousands of the very old and very young died for lack of it, while, when it could be obtained, it was generally of the worst quality. But in the next siege milk will be not only comparatively plentiful, but also extremely good. Dr. Autefage's process of "pasteurizing" milk has been adopted by the government, and the milk thus treated, and stored in hermetically sealed tins, remains absolutely pure and unaltered almost indefinitely.

The introduction of compressed fodder, and of the silo system, has facilitated the storage of sufficient food for the horses of the troops, as well as of the omnibuses, tramcars, sanitary service, etc., and it is difficult to believe that any future siege can last long enough to exhaust the huge accumulations that are permanently kept in readiness by renewal from time to time. Nor has the provision of coal, wood, charcoal, mineral oil, chemicals, and a thousand other things, been overlooked. Then there are the spacious dry cold-storage warehouses at La Villette.

At the first sign of danger, hundreds of thousands of sheep and oxen would be brought into Paris and slaughtered, and their carcasses would be stored there, where by means of the Fixary process, they can be kept sweet and fresh for many months. Paris, it is certain, will not be easily starved, and so long as she is in no danger of starving, she will run little risk of suffering from one of the worst of the ordinary consequences of a great siege—an epidemic.—*The National Review*.

#### THE EFFECT OF MODERN RIFLE FIRE.

Further observations of the effect of the fire of small-bore rifles are reported from Switzerland. The projectile in use there differs from that adopted in other countries. In the latter the core of hard lead is surrounded by a steel sheath, whereas in the Swiss projectile only the point is covered with a steel cap. Colonel Rubin, at whose suggestion this bullet was adopted, claims that it possesses two advantages—viz., that it wastes the rifle-barrel less, and that its initial velocity is greater. At first sight it seems singular that accounts of severe injuries caused by the bullet of the small-bore rifle should come from Switzerland of all countries, the land of the national militia. One would suppose that such injuries, which, under ordinary circumstances, are due to accidents, would hardly occur where the number of soldiers is so small. The explanation lies in the fact that the Swiss militiamen keep their so-called "orderly rifle" in their dwellings, with the result that the weapon easily gets into unskilled hands.

Of the four cases which Dr. Konrad Brunner, of Zurich, communicates to the "Correspondence Sheet for Swiss Medical Men," the following, observes a *Standard* correspondent, is the most remarkable:—A corporal in the militia shot himself with his rifle. The bullet went through his breast, injuring the lungs and the heart, and then passed through the room wall and a piece of wood fastened to it. In doing this it split into two parts, both of which wounded a woman who was at work near the opposite wall of the room into which the bullet penetrated. The second case is that of a boy

who played with his father's rifle, which went off while held upwards. The bullet passed through the ceiling, which consisted of two layers of plank, each an inch thick. It then struck a bed, and pierced a cross-laid wooden board, in passing through which it struck a knot, and burst into two pieces, which tore all the bedding to fragments, and wounded the boy's mother, who was making the bed, in the breast and one of the arms. In a third case the ball, after tearing and dashing to pieces the pharynx and the cervical segment of the vertebral column of a human being, bored its way several centimetres deep into a stone window-sill. Brunner agrees with Demosthène Hobart and others, who regard the opinion of the German surgeon, Bruns, that the small-bore projectile is the "most humane" of all, as utterly erroneous. As regards its effect in future warfare Brunner says:—

"Nobody will maintain that firing at close quarters will be rare in future wars. In decisive struggles the opponents will often shoot at one another at a much less range than the short shooting distance of five hundred metres. Fortified positions, farmhouses, and villages will often have to be carried by fighting at close quarters. Sudden nocturnal surprises will also not be wanting, especially in mountain warfare. Just imagine the effect of magazine-fire, then, on closed columns! Owing to the tremendous penetrative power of the small-bore bullets, cover will have to be used more extensively than hitherto."—*United Service Gazette*.

#### THE ABOLITION OF "THE SUPPORT."

Mr. A. Hilliard Atteridge, writing in the *United Service Magazine*, says:—"Major Macartney's article in the October number of the *United Service Magazine*\* concludes with a very important proposal: 'It seems absurd,' he writes, 'considering the far-reaching power of the weapons in the hands of the infantry, to hold back a fraction of men 150 to 200 yards in rear of the fighting-line. They are equally safe, and can use their rifles in the front itself, but in rear they only add to the depth of the formation and increase the danger. Of the 113 hits made on the 134 dummies at 1400 yards (in an experiment at Hythe), no less than 77 were on the supports. Why not abolish them by at once placing them in the firing-line, and keep the reserve as far out of harm's way as is consistent with its being able to afford support?' In connection with this proposal it is interesting to note that this change has been made in the new French Infantry Drill Book issued this year. The Drill Book of 1884, as modified by the provisional regulation of August, 1890, laid down a form of attack much the same as what we use, with the first line divided into firing-line (*chaîne*), support and reserve, the regular distances between the firing-line and the support being 250 metres, with 300 metres between the support and the reserve. Even while these regulations were still in force there was latterly a tendency to suppress the support. Thus when I was with Gen. du Guiny's corps during the manœuvres in the north of France in 1893 I frequently saw the firing-line advancing in single rank, shoulder to shoulder, with nothing between it and the reserve, the sections who should have formed the support being from

\* See JOURNAL No. 73, M. S. I., p. 102.

the very outside pushed into the firing-line, just as Major Macartney suggests. The new Drill Book does not merely permit, but enjoins this arrangement, and it was used throughout at the recent manœuvres. The introductory note to the first part of the Drill Book calls special attention to the abolition of the support as one of the most important changes in the new regulations. 'In the formation hitherto in use,' it says, 'the supports are exposed to the same fire that is directed at the firing-line. They suffer loss without being able to take any actual part in the fighting. \* \* \* In the new formation the company is placed in the fighting-line complete, and can thus from the very outset take a vigorous share in the action. Its captain has it well in hand, and not having to trouble himself about sections left in the rear, he can pay all his attention to the firing-line.' The battalion commander is directed to keep the reserves well to the rear, and as much under cover as possible, the mass only advancing when the time comes for the assault, all earlier reinforcements of the fighting-line being limited to what is necessary to keep it up to its original strength, *i. e.*, one rank, shoulder to shoulder. The ruling idea throughout is that with this formation and no supports there will be a heavier fire and less loss than with a thinner firing-line with supports close behind it. It is interesting to note that the Russian regulations for the infantry attack put half companies in the firing-line, with about 120 men to a front of 250 paces; 500 paces to the rear of this come the 'company reserves' formed of the other halves of each company; 500 paces still farther to the rear are the 'reserve companies of the battalion.' This arrangement makes the distance between the firing-line and the 'company reserve' (or as some foreign writers call it, the support), equivalent roughly to the distance between our firing-line and the reserves. The battalion reserve is very much in the position of our second line closing on the first. As for the firing-line shoulder to shoulder, it is used in other armies besides the French. The German firing-line is now either shoulder to shoulder or very near it, and the Austrian infantry regulations direct the firing-line to be formed of squads or sections in single rank, the men shoulder to shoulder, but with short intervals between each unit."—*Army and Navy Gazette*.

#### NEW CAVALRY DRILL, U. S. A.\*

Turning over the back numbers of the JOURNAL OF THE MILITARY SERVICE INSTITUTION (U. S. A.), we have come upon an unusually able paper on the "New Cavalry Drill," by Lieutenant W. H. Smith. Into details we need not enter, but some of the writer's comments show so distinctly where the shoe pinches, and reveal a state of affairs so strikingly identical with the condition of things that formerly obtained in India, and is yet by no means altogether eliminated in England, that we propose to quote at considerable length. It is also of special interest as showing how like causes—*viz.*, the habit of moving in small detachments, in which small errors do not accumulate, and a disregard for the minutiae of the riding school, inherent apparently in the Anglo-American race—lead to the same results. Speaking of the responsibilities of the squadron guides, he says:—"Every one will admit,

\*See JOURNAL No. 63, p. 535.



I think that if any number of men, no matter how few or many, be placed in line, and then started forward, all of them, moving straight to the front and at exactly the same pace, a perfect alignment will be kept. The secret, therefore, of moving in line is nothing more than riding straight with regularity of pace. Our regulations seem to deem the riding straight of such little importance that they entrust it to non-commissioned officers, who only get the chance of practice two or three times a week, who usually do not appreciate the importance of this fundamental requisite of a guide, and from want of practice would not be able to do so if they did. If any officer thinks it a very simple matter to ride perfectly straight, let him take his horse out on ground sufficiently soft to show his tracks, and then attempt to trot or gallop on some distant object. After a few hundred yards let him stop and look back. Unless he is more expert than the vast majority of officers I have known, he will see variations in his course of probably 3 to 5 ft. from the straight line. This seems very little, but it is exactly such variations which cause crowding or opening out, and when this error is multiplied, as it unavoidably is with numbers of men in line, it causes crowding or opening out far beyond what one would usually suppose possible from such a small beginning. In this illustration I have taken the most favorable circumstances of an intelligent officer not bothered by men jostling him on either side, or having his attention distracted by the numerous things which happen to a guide in the ranks when advancing at a rapid gait; but the jostling is amongst the least of the evils which arise with bodies of any size. Very frequently a guide when jostled, or when through any other cause he may have gotten off the original two points of direction, will take others not at all parallel to the true direction. In this way I have seen the direction changed as much as  $10^{\circ}$  to  $15^{\circ}$ , and the guides of other troops, being in the ranks and consequently unable to see this change of direction early enough, their troops either lose or increase their intervals, causing crowding or else increase of pace, and as this is repeated every few minutes the line begins to rock and sway, the men and horses get irritated, and, when the gallop sounds, the line, which should be closed like a wall, squanders like a pack of cards, and the effect of the shock is *nil*. This, too, when advancing over level ground, and without change of direction: substitute rolling downs and a moving object with constant change of formation, and all the evils become intensified many fold. About all the old drill regulations required of the officers was to keep out of the way of the men in the ranks. They neither regulated the pace nor the direction of the march, except to give commands. The new regulations have made one innovation for the safety of the officers: by providing that they shall not be ridden over by the men, for they now regulate the pace; but the equally important factor of controlling the direction has been left to the men. As a consequence of the little responsibility which our regulations have so long imposed on the subordinate officers, we have become the most careless riders of any civilized country. We may be roughly divided into two classes—the oldsters, who generally ride horses as old and staid as themselves, which protest vigorously against any pace faster than a walk or gentle amble; and the youngsters, who prefer horses that curvet and dance around, do anything



else, in fact, but go the required pace, their riders in the meanwhile fondly imagining themselves to be the admiration of the multitude, and that their only business at drill is to pose before the men and shout out such commands as 'hold up your heads there,' 'keep your horse in,' etc., all of which the men are usually endeavoring to do for themselves already. In support of some of the foregoing statements, I will instance the fact that it took something over two months' daily drill to get all the officers of five troops of cavalry so that they could ride three miles at the walk or trot with variations of less than a minute. I think it is fair to presume that it would have taken a month longer to have gotten them so that they could have ridden at a gallop with equal regularity and exactness.

"No attempt was made at these drills to increase or test the efficiency of the officers at riding straight on points, but, judging from experience, about a month more would have been required to obtain satisfactory requirements. But if it takes up all this time, drilling six days a week, to train an intelligent officer, how can anyone hope to properly qualify a body of N. C. O.'s who, as a rule, cannot attend drill nearly so often? Has not the practical working of our drill regulations for years shown the inexpediency of having the guide in the ranks. How many squadrons, or even troops for that matter, in our service can gallop in line half a mile or more over uneven ground with regularity of pace, the men well closed up, without crowding or jostling in the ranks? Very few I think.

"From my own observation, and that of others, I think that out of the 400 cavalry regiments or thereabout now in Europe, there are very few that cannot do so. I yield the palm to no one in being thoroughly American. I think European cavalries can learn quite as much from us as we can from them, but to discard a method which experience has demonstrated to be better, simply because it did not originate with ourselves, strikes me as essentially unpractical and therefore un-American. \* \* \*

"The objection is sometimes raised that an officer cannot ride straight to his front and at the same time superintend his men. If this is ever true it is due either to the inefficiency of the officer or the want of training or practice of his horse. Officers of European cavalries manage to set the pace and direction as well as superintend their men. Shall we acknowledge ourselves inferior to them in this vital qualification of a cavalry officer? \* \* \* I have been thus prolix on the subject of guides, because I regard pace and direction as the foundation of all cavalry movement, and if we are going to attempt to be anything more than *mounted infantry* I think it is very essential that we make some change in our drill regulations so as to make the chief at all times the leader of his command."

The above quotations give about as complete a picture of the state of the American cavalry as one could wish to find, pointing out the precise state of development they have reached, the causes of their inefficiency, and also the standpoint of the critic himself, whom I would gently remind that, though the difficulty of manœuvring with the guides in the ranks is undoubtedly greater than when they ride in front, yet where sound training of the recruits exists it is possible for cavalry to fulfill the highest demands of efficient manœuvring, with not only guides but officers and all in the ranks.

The Austrians did it for years, and attained the very highest standard, and though they have now gone in for the German system, it is principally because, with the short service system introduced since 1866, greater efficiency is attained in a shorter time.—*Journal of the Royal United Service Institution.*

## MUSKETRY EXPERIMENTS.

The chapter on experiments in the annual musketry report of the Indian Army, 1893-94, is extremely interesting. Why the bullet from a rifle is deflected when the bayonet is fixed is an old controversy, and the solution of the question seems as far off as ever. Thus with the Lee-Metford, having the new sword handle and ring fixed on and the blade cut off, the bullet carried, at 300 yards range, 1 ft. 9½ in. low and 1 ft. 7 in. to the left. With the Martini similarly dealt with the long bayonet socket being fixed, the deflection was 1 ft. 9 in. high and 3 in. to the left. With the blade lashed on in rear of the muzzle the Lee-Metford carried 6 in. high and 1 ft. 7 in. to the left; the Martini 1 ft. 10 in. high and 1 ft. 2½ in. to the right. Why the two rifles should show such different results is a puzzle. Further experiments confirmed what had already been established, namely, that with the Lee-Metford the fixing of the sword bayonet causes the bullet to drop considerably—as much as 3 ft. 10½ in. at 300 yards. With the Martini-Henry the long bayonet caused a rise in the flight of the bullet of 2 ft. 10 in., but the sword bayonet caused a fall of 2 ft. 6 in. As the tendency in action is for the men to fire high, it is plain that the sword has a distinct advantage over the long bayonet in influencing the flight of the bullet. The firing in all these instances was from sand-bag rests, and as it was carried out at Changla Gali School the tests may be relied upon.

Experiments in night firing from rests improvised during the day gave excellent results and they should be more extensively practiced. Since the affair at Wana there has been a good deal of discussion upon the subject of night attacks, so we may mention an ingenious device adopted at Changla Gali for keeping men in touch during pitch darkness. They had not only the usual ropes passing from hand to hand, but on the back of each section commander was placed a board painted with luminous composition. This apparently could be distinctly seen, and the game of follow-my-leader was made easy. It is a simple plan, and it might be expanded with advantage. Thus in a camp on which a night attack was expected to be made the alarm posts might be indicated by a few posts covered with luminous paint. These would be invisible to the enemy until he came to close quarters, but would be distinctly seen by our own officers and men when rushing to "quarters," to employ a naval term. If necessary, numbers could be painted up so as to prevent confusion. Anyone who has been in a night alarm, when the darkness is very great, knows how difficult it is to move to a named point with any certainty. Objects which in the daytime serve as landmarks seem to change their familiar shapes at night—one row of tents cannot be distinguished from another, the points of the compass cannot be studied, and even highly-trained troops may fall into confusion. And yet night attacks are likely to play a prominent part in modern warfare, for the storming of intrenched positions by daylight will be almost impossible

when the defenders are using machine guns and magazine rifles and firing with smokeless powder. The army which perfects itself in such attacks will be immensely superior to that which relies upon old-fashioned fighting in daylight. India is a country where experiments in the art of war can be carried out most successfully, and we venture to suggest one of those for the benefit of any enterprising general officer who may care to try it. It is a night attack in which not only the section commanders shall carry their luminous paint boards, but in which every individual soldier shall have this Will-o'-the-wisp mark upon him. This paint is now comparatively cheap, and a few pounds of it would suffice to make hundreds of luminous badges of such size as a few initial tests would show to be large enough. They might be worn on the arm or even on the helmet. The great aim is to prevent men losing touch with each other, and so long as sections can keep together direction can be maintained. The experiment is worth trying in order to test how far luminous badges would show when worn, say, by a whole regiment.—*Pioneer.*

BUFFINGTON-CROZIER DISAPPEARING GUN-CARRIAGE; DESCRIPTION.

On December 14, 1893, a Buffington-Crozier disappearing gun-carriage, mounting an 8-inch breech-loading rifle, was tested at the Sandy Hook Proving Ground with most remarkable results. It required only 12 minutes and 3 seconds for this carriage worked by seven gunners, to fire ten shots. The wonderful aspect of this performance will be understood when it is explained that with every shot the rifle, weighing 33,000 pounds, was lifted from its loading position, and projected forward as though over a parapet. As the shot left the muzzle, when fired, the gun, recoiling without a jar, settled lightly upon its carriage-bed ready for the next load.

The underlying principle of the mechanism is founded upon the geometric theories that if a right line move so that two of its points remain upon two other lines making an angle with each other, the extremity, or any other point of the moving line will describe an ellipse. The trunnions of the gun are mounted at the ends of two levers, which in turn are mounted at their centres on two hydraulic buffing cylinders, which are placed one on each side of the top of the carriage. The other ends of these levers carry the counterweight, a mass of metal weighing 37,000 pounds, placed in the centre of the carriage under the gun. When the gun is in the loading position, the hydraulic cylinders are thrown to the extreme rear end of the carriage, carrying with them the trunnions of the supporting levers and raising the counterweight, which is held in its elevated position by a system of pawls and ratchets. When the counterweight is released, it throws the rear ends of the gun-bearing levers forward and upward. The buffing cylinders are drawn forward over their stationary pistons to the front end of the carriage. At the same time the breech of the gun is carried up by steel arms, whose upper ends are pivoted to the gun, and whose lower ends are pivoted to sliding blocks which move in circular grooves, and which may be raised or lowered to give the desired elevation. When the discharge occurs, the force of recoil throws back the upper ends of the levers, which, in turn, force the cylinders to the rear end of the carriage and raise the

counterweight to its original position, where it is caught and held by the pawls and ratchets. Neither the gun nor any part of the carriage is exposed above the protecting parapet except for the instant of firing. The carriage allows a total vertical range of  $20^{\circ}$ ,  $15'$ , of elevation, and  $5^{\circ}$  of depression. It is calculated that two-thirds of the force of the recoil comes upon the hydraulic cylinders, the other third being used in raising the counterweight. It will be seen that the first movement of the gun at discharge is along a path nearly horizontal, and that the final movement, as it disappears behind the parapet, is nearly vertical. In the final test each shot weighed 400 pounds, and was fired with a charge of 125 pounds of brown prismatic powder.

The carriage weighs 100,000 pounds. The steel castings were furnished by the Midvale Steel Company, of Philadelphia, and the work was done by the Southwark Foundry and Machine Company, of the same place.

The record made during this test has no equal in the history of modern ordnance. It excels the rapid-fire tests of 8-inch guns at Annapolis, where the rifles were mounted on stationary carriages of ordinary pattern, and where eight shots in 10 minutes and 20 seconds was the best work done. Further than this, it places at the disposal of the Government a disappearing gun-carriage unequalled by anything of the kind employed abroad.—*Proceedings of U. S. Naval Institute*.

#### FIRTH ARMOR-PIERCING PROJECTILE: TEST.

A test of a Firth armor-piercing 9.2-inch, forged steel projectile was recently made at Shoenbury. It was one of a lot of 160 presented for acceptance, and two were selected at random for proof. The projectiles were all of 9.2-inch calibre and weighed 380 pounds each. The first was fired with a striking velocity of 1985 feet per second against a 14-inch compound plate. The result was regarded as highly satisfactory. The shot passed through the centre of the plate, then through 4 feet of oak backing, and buried itself in a heap of sand in the rear. Upon recovery and examination no cracks were found, and the projectile was very little deformed; there was a slight bulge near the front band, and the total upsetting amounted to 0.6-inch in a length of 29 inches. In view of the satisfactory character of the result, the lot were accepted without firing a second shot.

#### DISPATCH-BEARERS.

The German military authorities have decided to apply to Parliament for a special grant for the training of dispatch-bearers in the army. During the Franco-German War the want of reliable dispatch-bearers was much felt, and since then it has been the aim of the War Office to improve this part of the service. The men who are to be employed in this capacity must possess certain qualifications fitting them for the duties; they must be naturally intelligent, good riders, capable of guiding themselves by aid of a map either by night or day. They must be able to use the telephone, to judge distances, and also estimate the strength of the enemy; to grasp orders quickly and repeat them accurately. The men, in addition to all this, must be self-reliant, and practiced in riding long distances without tir-

ing their horses, and be able to overcome any obstacles they may meet with on the road. All these qualifications must be brought to perfection by a thorough course of training and constant practice. The horses used in carrying dispatches must also be specially chosen for their light weight, their speed, etc., and must receive a special training. It is proposed that three detachments of dispatch-bearers, each detachment consisting of twelve non-commissioned officers, ninety-six men, and 108 horses, be attached to the 1st, the 16th, and 17th Army Corps in order to test the system. The men employed in this branch of the service will wear a particular sort of uniform by which they may be known, and which will be made to combine the quality of lightness, and be of a color which will be as indistinguishable as possible from a distance. The dispatch-bearers will be armed with a sword and revolver, and will be well drilled in the use of these weapons. The idea that bicycles or tricycles would prove useful in carrying dispatches in war-time is now quite an exploded one; for although they often beat horses in speed on made roads, messengers on horseback in rough country far surpass them. The tricycle will still hold its own in ordinary orderly duty, but it can never replace the mounted dispatch-bearers. —*Army and Navy Gazette.*

#### STERILIZATION OF WATER.

In an article on army filters and the purification of water in the *Militär Zeitung*, it is stated that a few grains of chloride of lime suffice instantly to destroy any bacillus present in the water (20 grains to the gallon). This amount leaves no taste in the water, but rather freshens it up. "Feric periodate," Weaver's preparation, is known to possess the same qualities, and it is claimed for it by the inventors that it is also both a preventive and cure for cholera, malarial fever, and all other diseases due to bacillus poisoning. It was tried during the Hamburg epidemic with excellent results, but on patients in the last stage of collapse, to whom it had to be administered by hypodermic injection, no opportunity occurred to establish its preventive value, but reasoning on common sense principles it would appear to have every chance of success. The weight to be carried in an individual's kit would be almost infinitesimal, probably 2 ounces would suffice for a six months' march, and in places where ulcers and sores give much trouble it should prove invaluable for cleansing wounds, etc.—*Journal R. U. S. I.*

## Reviews and Exchanges.

### Organization and Tactics.\*

THE codification of any art for the purpose of instruction therein, must always be a difficult undertaking. Indeed it is doubtful if a working knowledge of any art can ever be obtained in that way. Any proposition of the kind with regard to painting, sculpture, or even honest shoemaking, would be an unmistakable absurdity. But military art seems to be considered an exception. That the art of war can be acquired from books is one of the favorite fallacies of the day. And so the array of text-books on the subject is constantly increasing. The book before us is one of the latest arrivals. That it is as good as the average we do not doubt. That it adds anything new to the art we do not expect. But however excellent its teachings may be, if unaccompanied by practical applications, they can never make a tactician and may possibly spoil a few. Apprentices to the military art must learn to do things, not merely to talk of doing them, if they would ever become masters. The art of war is a trade to be learned, and actual war is the best school to learn it in. The mimicry of war—such as field manoeuvres and the practical application of tactical problems—is, certainly, the second best. All others are nowhere. In the second best if anywhere, military text-books must find their field of usefulness. To be able to recite their contents is no proof of efficiency; to be able to apply their teachings is. Experience must be had, and it cannot be purchased second hand. Military history must be studied, sifted and applied if we would be benefited by it, and the application is too often omitted.

But all this is by the way, and has no special reference to the book before us, to which we now turn. It is a goodly book; well printed; well indexed; and without illustrations. The last feature is no disadvantage in a text-book. A good text-book should trace its illustrations in the mind of the learner. Illustrated ideas are never thoroughly acquired. The mind catches them at once, and forgets them readily. They are like dreams. Another important feature catches our eye at the first glance—the book is expensive.

The preface is always an interesting part of the book to a reviewer. It is a kind of introduction to the author, and often contains a clue to his personal opinion of the work; or his views on some disputed question. In this case we learn that the author believes, that under certain specified conditions "war would become almost an exact science." (vi.) Now, that we should certainly deny, if it were not for the word "almost." Did ever anybody who has seen a demoralized regiment, or a panic-stricken army, doubt the presence of some mysterious power which the science of war, exact or otherwise, could not account for? General Sherman said that an army had a soul which could be controlled. But the psychology of war is always avoided by text writers. Still the men most familiar with war, are satisfied that there is an invisible factor in all its problems which completely controls the result.

We are also glad to learn that the author is no believer in book-made generals. However highly he may value text-book learning, he believes in fixing it in the mind by practical applications.

\* *Organization and Tactics*. By Captain Arthur L. Wagner, 6th Infantry. B. Westerman and Co., New York, London, Paris.

There has never been a military writer who failed to try his hand at a definition of strategy, and this author is no exception to the rule. The result is hardly satisfactory. It is too elaborate for a text-book. Indeed a concise and comprehensive definition can hardly be said to exist. A text-book definition is intended to be committed to memory, and should be short. Strategy is the art of putting an adversary at a disadvantage, and nothing beyond that need be stated.

The functions of the Artillery Reserve are very generally misunderstood; but its abolition in an American army is, to say the least, rather unexpected. (13.) Perhaps the "deadening effect" of the name is to be credited with the proposition. As a matter of fact the word *Reserve* is a misnomer. It is not a Reserve in the ordinary acceptance of that term. On the contrary the Reserve batteries are generally the first engaged. It is with them that the commanding general prepares the way for dealing the decisive blow. The Artillery Reserve is the thunderbolt which he holds in his hand, ready to be hurled at that part of the enemy's line which he has determined to attack. A preponderance of artillery at that particular point is absolutely essential to success. He cannot procure such preponderance by drawing batteries from other corps without emasculating the deprived organizations and dangerously weakening his line. Therefore the Artillery Reserve is a necessity. And the principle holds good throughout the army organization. An army corps is, or ought to be, a little army, complete in all its parts; and the corps artillery is its Artillery Reserve. We cannot conceive of an American army, or an American army corps, joining battle with an equal adversary without such an organization.

Of course superfluous artillery is simply impedimenta, and the proper proportion of artillery in an army is a variable quantity. Good infantry can get along with much less artillery than bad or indifferent infantry. So an American army, composed largely of green troops, needs more artillery at the beginning of a war, than after they become seasoned. Indeed the quality of the infantry is the controlling factor in determining the size of the artillery contingent; although the author does not permit it to appear among his determining considerations. (14.) The enormous size of European armies and army corps, and the excellence of the roads, lateral and direct, may induce a distribution of the Army Artillery Reserve among the corps artillery, but it would be an unsafe precedent for an American general to follow, even if it were wise to transfer the thunderbolt to other hands than his own. Not every European shoe will fit the American foot, and there are many military arrangements, excellent enough in their natural habitat, but altogether unsuited to American conditions. Europe has drawn many military ideas from America, but she has been particular in her selections. Let us follow her example, and copy with care.

But the abolition, or distribution, of the Artillery Reserve is not the only startling suggestion in the book. The author declares, and we are bound to believe that he does so on tactical grounds, that every regiment of infantry, cavalry and artillery in time of war, should have a depot battalion. (37.) We have heard a good deal of late about the absolute necessity, also on tactical grounds, that a regiment of infantry in the field should consist of three battalions. What then, may we ask, should the infantry regimental organization actually be?

But whatever the organization, discipline is the cement that holds it together. An army is only an armed mob plus military discipline; and one of the principal reasons for its existence in a country like ours in time of peace, is the preservation of traditional discipline. Of course soldiers in war time will have work to do and hardships to endure to which they were entire strangers in time of peace. But that fact has nothing to do with discipline. (39.) Discipline must be enforced in war time, no doubt; but must it not be enforced in peace time also? In either case punishments must wax



as discipline wanes, and *vice versa*. The passage from slackness to severity at the beginning of a war for any other reason, would probably end in demoralization.

The "Hangman's Whip" should be used as sparingly as possible. If an officer has acquired the art of command, he will have very little use for it. Unfortunately the art of command has no place in the curriculum of any of our schools. Still it would be a far more profitable study for company officers than the art of war. That most wonderful piece of mechanism, the human body, and its most mysterious occupant, the human soul, should not be treated like the tin soldiers of a kriegsspiel board. General Sherman has said that every army has a soul. We believe it and therefore claim that it can be controlled without the constant use of the "Hangman's Whip." The few pages devoted to this subject are the brightest in the book.

The chapter devoted to the characteristics of infantry, cavalry and artillery contains only a concise statement of generally accepted opinions, all of which we pass without remark. There is, however, one opinion which cannot be said to be so accepted. In speaking of machine guns the author says "They should be a part of the general artillery command." (67.) We do not accept that statement and should feel obliged to controvert it if it were not for the subsequent admission that "The functions of machine guns on the field of battle are not yet fully determined." (67.) One thing, however, is determined; the machine gun is not an artillery weapon.

In Chapter IV. we have what might be called a historical sketch of the evolution of infantry tactics; and so closely does the development follow the improvements in the infantry weapon that we are forced to admit that the blacksmith is at least the foster father of the art of war. The man and the musket determine the tactics. As they improve in quality, tactical formations diminish in depth, and *vice versa*. This is well illustrated in Napoleon's army. As his veterans disappeared his columns deepened, until they reached the vicious depth of Macdonald's formation at Wagram. Victory won in that way was even worse than ordinary defeat. (83.) Yet, strange to say, the glamour of Napoleon's success induced some officers, who ought to have known better, to copy this vicious formation with good troops, and the result was disaster. (85.)

Military men are always conservative. Martin Burke opposed the introduction of the percussion cap into our army, and the Duke of Wellington opposed the adoption of the rifle as the weapon for British infantry. We should not be surprised then that the Crimean War and the Italian War exhibited similar conservatism. Nothing but a beating can cure military conservatism, and even a beating sometimes fails. It was not until our war, the War of Secession, that new tactical features were permitted to appear on the battle-field. At Donelson we find examples of common sense and conservatism side by side. One Union brigade attacked in an unheard of way, namely by rushes. Another Union brigade, commanded no doubt by a student of Jomini, attacked in column sixteen ranks deep. Both attacks were successful: but the latter lost twice as many men as the former. (88.)

In course of time experience taught the true formation for attack under the then existing conditions; but not until the pendulum had swung decidedly the other way, and converted the line of battle into a heavy but often unmanageable skirmish line. (93.) But experience and common sense having thus obtained a footing, other radical changes were introduced. Hasty intrenchments became prominent features on every battle-field, and armies learned, not only to intrench their lines, but sometimes even their bivouacs. (94.) And many European armies have been driven, partly perhaps by our example, and partly by their own experience, to adopt these innovations. (187.) Even the Turks adopted them. (101.)

Naturally enough, the attack by infantry described in Chapter V. is the attack pre-

scribed in the Drill Regulations. It is well described and satisfactorily explained, as far as the explanation goes. But all the stumbling blocks have been carefully avoided, perhaps wisely so. It is doubtful if anything but experience will ever determine whether or not a line of squads can be driven across the danger, and into the deadly zone. That men standing shoulder to shoulder can be so led, was proved at Spicheren, in the attack by six companies on the Golden Breme and the Barrack Mouton. But the favorite fallacy of the advocates of dispersion is the assumption that any attack must be driven forward over 3000 yards of perfectly level ground. A common sense commander would surely avoid such places. Modern lines of battles—many of them five or even ten miles long—would surely offer more favorable conditions somewhere. If they do not manœuvring must still be possible. The four principles laid down on page 105 are all very well; but they should be prefaced with a demonstration that a position must be attacked in front and over open ground absolutely devoid of cover or concealment. When that proposition is proved it will be time enough to consider how it is to be done.

Extended order has undoubtedly many distinguished advocates here and abroad; although it has recently fallen into disfavor in several European armies. It is unnecessary to enter into the arguments against it here. Experience alone can determine its usefulness. But the mere proposition to transfer control to non-commissioned officers at the very moment when that kind of duty is most difficult to do, is, to say the least a rather startling one. Then those "simple rules" for fire-discipline (111) are not so easy to obey under line of battle conditions as some people may imagine. The man that rammed 23 cartridges into his musket at Gettysburg without discovering his mistake was no coward; but he was not in a condition to give much attention to even "simple rules." Few men who have had battle experience even, have any idea how nervous and excited they actually are under a galling artillery fire. Let them try next time to thread a needle under such conditions, and they will find out.

It is so easy to lay down rules—to say, for instance, that men should be instructed to utilize cover, and also "Taught to leave it at the word of command." (116.) An easy way that to dispose of a difficulty. But how is a man to know that they will obey? That they do it promptly enough when they know that there are no bullets in the adversary's guns, is no proof that they will do it in the deadly zone during a battle. Such things cannot be taught.

Working out a theoretical attack often leads one into conflicting statements. The fact, for instance, that an infantry attack must have an artillery prelude and demands the presence on the spot of "A superior force of artillery," (114) must have been overlooked when the author dispensed with an Artillery Reserve in his army organization. (113.) Where is that superior force of artillery to come from? The Divisional and Corps Artillery will be opposed by the Divisional and Corps Artillery on the other side, and as there is no artillery reserve the attack must either be made without artillery preparation or abandoned altogether.

Doubtless some of these seeming contradictions and inconsistencies will be eliminated or explained in subsequent editions. They are not, generally, so important as to constitute serious blemishes. Still, in a text-book, they should not exist. As a sample take the following. In speaking of the distance between the firing line and the supports in an infantry attack, the author says "It should be greater when the trajectory of the enemy's rifle is flat." (122.) Of course, it is easy to see what is meant; but there are men who would argue that because the trajectory of the enemy's rifle is flattest at short range, the distance between the firing line and the supports should be greatest at these ranges.

The frontal attack by infantry as prescribed in the Drill Regulations and discussed

in this book, has produced considerable diversity of opinion among military men in this country. Many believe that it cannot stand the test of battle. If it does it will be a clear demonstration that two-thirds of the company officers are superfluous.

The flank attack (141) presents an alternative solution of the tactical problem, which, although difficult and dangerous as all the operations of war naturally are, discloses a far more attractive picture of battle than the frontal attack. It also shows that the game of war, instead of becoming more and more a soldier's game, needs superior direction and leading more than ever. Discipline, marksmanship and valor in the ranks are, no doubt, important and desirable; but generalship alone can make them effective.

In the VI. and VII. chapters the author discusses the evolution of cavalry organization and tactics, and the employment of that arm on the battle-fields of history. They are interesting, comprehensive and instructive and not to be criticised except by an expert.

The historical sketch of Artillery contained in Chapter IX. is somewhat elaborate for a work on tactics. The evolution of the gun is traced from the clumsy bombard of the 14th century to the breech-loading cannon of to-day. Even the leather guns of Gustavus Adolphus are not overlooked. All this is interesting enough and accurate enough; but out of place in a treatise on modern tactics. Chapter X., devoted exclusively to tactics, is also overloaded with details, which must be confusing to students unacquainted with the specialties of the arm, and altogether unnecessary to instructed artillerymen. Still the rôle of the artillery in the drama of attack and defense is all there, and stands out clearly enough when the surplusage is winnowed away. We notice some new names—importations from abroad—which might have been dispensed with; but on the whole, barring the details already referred to, the work has been well done. Of course we object to the abolition of the Artillery Reserve, and wonder that the author himself failed to recognize the necessity for its existence when he came to discuss the artillery duel, and the other artillery features of the attack.

The perfect artillery position should never be described, because it is never to be found on any battle-field. (312.) Inexperienced commanders are in no way helped by such descriptions, and they may lose much time and temper looking for the nonexistent. As a rule, there are not many suitable artillery positions to choose from, and if there be one—a key point—which affords facilities for delivering an effective fire on the enemy, any disadvantages which it may have, must be put up with. There are not many key points on the front of battle, even of a corps.

But we have carried our comments beyond the usual limits of a review. There are many points connected with the use of artillery which we had intended to notice; but we refrain. It would be unwise to enter upon such subjects at the end of an article. Many of the apparent departures from accepted principles are only apparent, and can be sifted out easily by the careful reader. As an illustration of what we mean we quote from page 325. "It is preferable, we think, to distribute guns throughout the whole front." Most artillery officers believe otherwise. We suffered terribly from that heresy during the early years of our war. Artillery should be assembled in large batteries on the key points of the position. There may be two such positions on the battle front of a corps. There the divisional artillery come into battery, and are promptly reinforced by the corps batteries. If the point selected for attack be in front of that particular corps, these batteries will be heavily reinforced from the Reserve Artillery of the army, until a decided preponderance over the enemy's artillery is established. Then the artillery duel will be a short one, and the preparation of the hostile infantry for defeat will be promptly performed.

JAMES CHESTER,  
Captain 3d Artillery.

## General Hancock.\*

Thirty years have passed since the peace of Appomattox and yet the time has not arrived when the events culminating in that result—particularly those of the year beginning with the battles of the Wilderness and ending in the surrender of Lee—can be sketched with that unreserve of indifference to actors and locality that brings out the truth, the whole truth and nothing but the truth.

If the Church officially ceased to regard Charles the First as a martyr and abolished the stated fast on the anniversary of his execution less than forty years ago—if Englishmen can still write of Cromwell as a rebel and a usurper—the day for a perfectly achromatic review of our secession and restoration is still very remote.

"Grand, gloomy and peculiar, he sat upon the throne a sceptred hermit, wrapped in the solitude of his own originality."—That is the way the orator exhibits Napoleon.

"At midnight from his tomb  
The Chief awoke and rose,  
And followed by his staff  
With slow steps on he goes.  
A little hat he wears,  
A coat quite plain has he;  
A little sword alone  
At his left side hangs free,  
The ranks present their arms,  
Deep rolls the drum the while.  
Recovering then, the troops  
Before the Chief defile."

So appears he to the poet. But whether on the pages of the official or popular record there is little doubt of the place General Hancock will occupy.

The twenty-five years that intervened between York River and Governor's Island, that included such a moment of triumph as the repulse of Pickett at Gettysburg and such a moment of trial as the failure at Ream's Station, all the chances and purpose, the effort and the resistance lit up by the fires of the Wilderness, all the disaster and success of that forty days passover from the Rapidan to the James will only gain in interest and fascination as they pass out of the hands of the students and singers that are yet to prolong the wonderful story of the Great Rebellion.

Certainly it is a matter of regret that the general who had so often led such large commands into the smoke of battle was not one of the "Happy Warriors" under whom the fruits of the four years struggle were harvested on the Slopes of Farmville. It would have been a fitting exodus to the beginning on the Peninsula with its reported "Gentlemen, charge!"

As we turn over the leaves of this volume the familiar names of Antietam, Marye's Heights, Culp's Hill, Spottsylvania, The Salient, Cold Harbor, Petersburg, and the Weldon Railroad with their disputed conclusions all testify that we yet walk

"Per ignes  
Suppositos cineri doloso."

and in the brief space of this notice it will be enough to delay rather where the ashes of no controversy whiten the path and clog the feet.

A very deserved tribute is rendered to Colonel Mitchell, so long and so helpfully associated with General Hancock.

It was no ordinary service that he rendered his chief. That the General is to-day remembered by so many with increasing affection and respect is due not only to his own high qualities of mind and manner but also to the sagacious vigilance of his adjutant,

\* *General Hancock: Great Commander Series.* By General Francis A. Walker. D. Appleton & Co., New York.

through whom intercourse at headquarters lost nothing of its usual charm and a good deal of its occasional abruptness. Therefore it is that in a true life of General Hancock Colonel Mitchell must always take a peculiar and important part.

According to General Walker it could not be said of the old army,

"Nullius addictus jurare in verba magistri."

On the contrary there were among us, he thinks, several adepts in the art of anathema.

Well—we did hear during the war some very complete profanity. Two generals we remember, whose accomplishments in this respect showed long practice and great ingenuity. One was a volunteer pure and simple, the other was not. But we are compelled to admit, with a little regret at the inferiority of the ritual used in the regular service, that it entirely lacked the variety and the long-linked combinations of this individual volunteer, as may be judged from the fact that he alone was selected for the responsible post of swearing a whole army corps across a difficult ford at a time when all the proprieties had to be sacrificed to dispatch.

"A grave rebuke," which General Walker reasonably prefers, would have been more courteous, but there are occasions—most of us know the story of the bishop over whose broadcloth a stupid servant spilled the soup. A strange light glittered in the episcopal eye, but only for a moment. Then he leaned forward and said in a low, sweet voice, "Won't some layman present make the appropriate remark?"

So on the occasion referred to above, with a blacksnake whip and a cyclopædia of wild-west oaths, battery, baggage wagon and ambulance were projected through the water and over the stones at a speed that may not have pardoned the interjections but certainly won the crossing and established the proficiency of the volunteer general way beyond the reach of any benefit possible from army tuition.

Only the fellowship of service could have described General Hancock so truly as in these words: "He had courage—fiery, enthusiastic courage—positive, active, unfaltering loyalty to country and comrade, he had industry beyond measure—the ambition that stirs to do great deeds and be worthy of high promotion—above all an unrest while anything remained to be done, a dissatisfaction with what was incomplete, a repugnance to all that was slovenly, clumsy, coarse, or half-made up."

It was not enough to do a thing but it must be done in the best possible way and no precaution omitted to secure the perfect result. These are excellent qualities, the union of which is not common.

Also on the field of battle General Hancock was seldom equalled for "the promptitude and directness with which he made appropriate dispositions whether for attack or defense however sharp and sudden the emergency."

And there are those who can recollect how in the midst of questions of administration that extended from the Lakes to the Gulf he would take his post-commander by the arm and lead him past smooth lawns and well swept walks to some remote corner and without a word point—perhaps to a couple of almost imperceptible shavings that had escaped the search of the police.

For he could, if necessary, descend into the minute detail of the parade or rise to the intricate and manifold needs of a campaign.

He was fortunate too in his early career. General Walker forcibly states the advantages and results both to General Hancock himself and to the service of the duties discharged by the General and the posts filled by him in Mexico, Florida and in California up to the outbreak of the Rebellion.

He gained thereby just the experience needed in organization, movement, equipment and supply as he rose successively to the command of brigade, division and army.

In these three hundred pages what could be told of General Hancock has been told with marked success. The outline is cut, clear and true, against the background of his

time, but there is much in the character of the General and the events of his life that lends itself readily to tales of the fireside, and as the restraint of contemporary knowledge is removed our children will get the light and the shade, the color and the glow of some Revisionist moving with free hand through the Pentateuch of our Civil War.

Military renown has entered as a prominent factor into the selection of many political standard bearers. The names of Jackson, Harrison, Scott, and Taylor were to be followed by those of Grant and Hancock. Of these, two never went beyond the nomination, finding no defeat on the field like that in the ballot box. Two fell at their posts, and two served each a double term when military vigor and decision were more needed in administration than the slow circumlocution of cabinets.

It is certain that General Hancock would have brought to this high office special advantages not always found in military commissions. Soldiers are but little given to the inquisitive patience with which statesmen untie their knots, preferring to make use of time, precedent and concession rather than the edge of the sword.

As for the famous remark about the tariff being a local issue it was one of the few sensible things said about that incubus which simply manages to pool all sorts of local issues into one grand combination against—the man with a salary. Mills and manufacturers from maple sugar to Wamasutta muslin, from the rice plantation to the silver mine, alike demand protection. "Infant Industries" they all are and never seem to get out of the infantile stage but continually do cry for tariff pap as loudly as the regular baby is advertised to cry for castoria. Why not be logical and "protect" the army from dangerous competition by taxing the—Seventh Regiment for instance? Or that gubernatorial aide-de-camp who is to go on duty in a \$1500 uniform?

General Walker has a word of appropriate recognition for "the public spirit of the youth of 1861 who by their own free act and choice cut themselves off from home and friends and rallied round the flag of the Union."

And the General gracefully extends this recognition to the officers of the regular army, "educated and bred under circumstances which made their country a constant object of regard and which magnified and exacted every consideration relating to its honor and dignity."

Shall a man, in fact, be better known by his Sunday coat than by his secular garb?

Will an anniversary dinner be a truer guide to his habitual living than his daily fare?

While it is said of General Hancock that "to the very centre of his being he was loyal to the constitution and the laws," we are also glad to note the statement that "he thought all talk about traitors and sour apple trees was puerile." And it was puerile in the case of men who were known—and known to none so well as to those who had once fought and served together with them—"painfully and reluctantly to have broken the main ties of their lives in taking the other side."

They were obedient to the associations, feelings and teachings that surrounded them from birth upwards, and if some remained who broke their bonds and said with Webster, "I was born an American, I live an American, I shall die an American," we neither withhold from them the highest praise that can be given, nor deny its due to a patriotism that found its limits nearer home.

Men from the North and South came up to the crisis of 1861 under far different conditions of belief—in each sincere—as to the state and their obligations to the state as well as to the question of slavery that was the rift in the lute from the beginning. What court and senate failed to adjust was settled at the point of the bayonet, precisely as push of pike disposed of the quarrel between Cavalier and Puritan.

If even our fossilized theology is waking up to the thought that however far apart Calvin and Cicero may be both are within the circle of God's mercy and alike in the



need of it, was there a deeper gulf in the political sectarianism of John Adams and Jefferson?

Since they both died on the same day doubtless they have also now found other points of agreement wholly unsuspected in the dust and dirt, in the loud and brawling life of politics.

It is not every stout heart and faithful soul that wins a burial in Westminster Abbey. The heads of some get no further than Temple Bar. But—

"The thoughts of men are widened with the process of the suns."

And along the Cathedral walls sculptured embodiments of leaders once opposed look down upon the united veneration of their countrymen.

Meanwhile they rest—

"Under the sod and dew  
Waiting the judgment day.  
Under the roses the blue,  
Under the lilies the gray."

H. W. C.

### The Military Medical Officer in Peace and War.\*

The military medical officer is too seldom remembered in the enumeration of medical specialists, and yet there is no specialty more clearly defined than that practised by him. Major Hoff's able address calls attention to this fact in a forcible and effective way that cannot but have unlimited influence with the profession. His picture of the work of the medical officer is drawn with a master hand. It shows his restrictions and his privileges and traces his professional career from the time when, as a "fledgling of Æsculapius fallen into the lap of Mars," he enters the army medical school, until he becomes a fully qualified military medical specialist. By a detailed recital of the work required of the medical officer it demonstrates the vast extent of his duties and the wide range of his field.

The very title of the address is suggestive. Of the 304,369 cases of death due to the War of the Rebellion, as Major Hoff remarks, only 93,969 were due to surgical causes, while 210,400, or more than twice that number were medical in origin. The title "military medical officer" then is vastly more appropriate than "army surgeon" or "medical surgeon." Indeed the medical and hygienic work of the medical officer is so much more important in war and so infinitely more important in peace that the title "surgeon" is essentially a misnomer. The garrison colloquialisms "major-doctor" or "captain-doctor" are really more descriptive of the functions of the medical officer than his official designation. Major Hoff also eschews that insinuating and convenient but erroneous term, "post surgeon." With authority of neither law nor regulation this title has crept into our vernacular; as referring to the senior medical officer; liberally, however, all medical officers on duty at a post are post surgeons. The term "senior medical officer," employed by Major Hoff, is authorized by regulations, is fully as convenient and far more correct. It also implies that the medical officers of lower rank are "junior medical officers"—a decided improvement upon the misleading title of "assistant surgeon," or "my assistant" as the junior is not unfrequently styled by the senior. In our service, the title of "assistant surgeon" is particularly inapplicable, for assistant surgeons are in a large proportion of cases the senior surgeons of their posts; in a recent station list, five-eighths of the captains and exactly one-half of the entire list of assistant surgeons are the senior medical officers of their stations. More—

\**The Military Medical Officer in Peace and War.* A Lecture read before the Medical School of Harvard University. By John Van Rensselaer Hoff, A.M., M.D., Major and Surgeon U. S. Army. Reprint from the *Boston Medical and Surgical Journal*, Dec., 1894.



over, in the large majority of instances, the junior medical officers at posts perform independently certain duties to which they have been assigned and are in no sense the assistants of the senior. As well might all line officers be styled assistant colonels. To be correct and consistent, then, the word "surgeon" should be dropped entirely from the titles of our medical officers and the designation "assistant surgeon" with even more reason be entirely abandoned. The rank is already shown by the military title and the corps might with propriety be shown by the words, "medical corps" or "medical department." "Captain medical department" is better descriptive of the position and duties of the medical officer of that grade than is "captain and assistant surgeon," while at the same time it is less cumbersome and more logical. The professional title, "Doctor" will doubtless cling to the medical officer for non-official purposes during the indefinite future as it has in the definite past.

Many other lines of thought are suggested by Major Hoff's scholarly lecture, but to follow them up would far exceed the limits suitable for a book review. It is broad in scope, minute in detail and remarkably adapted to its mission of demonstrating the importance of military medicine and surgery as a specialty.

JAMES E. PILCHER.

### Sanitation and Health.\*

Says Sir George White, "What is a soldier without health and power of endurance? He is a fraud. He is being educated and paid, not for parade purposes in time of peace, for a soldier in peace is like a chimney in summer, but for a sterner occasion, which, if it occurs during his service, he will be found unfit to cope with."

Appreciating the truth of the foregoing and the fact that it is largely through ignorance the soldier neglects his health, Colonel Hart sought to instruct the men of his command in the simplest rules of military sanitation; sepsis [putrefaction], preventable diseases, first aid in illness and injury, hygiene, etc. His introductory remark is the index to his work, "Even an elementary knowledge of sanitation saves many lives and much suffering"; and the admirable and interesting manner in which he has presented the subject makes his book of value to the military reader.

Perhaps the most remarkable feature of this little monograph is, that it is the work of an officer belonging to a class which in the past considered it "effeminate to be ill," and until recently has, as a rule, taken but little interest in the very important subject of which it treats. Health is almost indispensable under all conditions, but in war, says Napoleon, "it cannot be replaced by anything."

J. V. R. H.

### Range Manual and Score Record.†

To all interested in the development of rifle practice in the National Guard of the country, it is a question of primal importance to consider what is best to be done and what can be done to incite, to develop and maintain skill and confidence in the use of the service small arm, reference being made to conditions, appliances, material, time, facilities and temperament.

Col. Rice has brought to the solution of these matters, enthusiasm, common sense, experience, an accurate knowledge of his subject in all its bearings and a thorough comprehension of the *personnel*, as well as *materiel* of the National Guard.

\* *Sanitation and Health*. A Lecture delivered to the troops at Ranikhet, India, by Colonel Reginald C. Hart, V. C., R. E. Revised by Brigade Surgeon, Lieutenant Colonel, T. H. Hendley, C. I. E. London: Wm. Clowes and Sons, 13 Charing Cross, S. W., 1894.

† *Range Manual and Score Record*. By Colonel James M. Rice, Inspector of Rifle Practice, Illinois National Guard, Springfield, Ill.

Comparison of the system of Small Arms Firing Regulations, adopted for the guidance of the army, is natural and proper.

The system adopted by Capt. Stanhope E. Blunt was approved by the Secretary of War early in 1885. With modifications by the author, it has commended itself to the army and to most of the States having an efficient military force, ever since.

It has been demonstrated that, owing to changed conditions of occasional military service, more or less voluntary attendance at the armory, remoteness of a firing range, paucity of ammunition, sacrifice of time and money, brief period of continuance in the National Guard, etc., some modification of "Blunt's" requirements was necessary; otherwise the National Guardsman would go on in the old rut of using his service rifle to drill with, but not to shoot with—for display rather than for its normal use.

The work of Col. Rice shows he has made a careful and accurate analysis of the army system of Small Arms instruction, practice and competition. I do not know, anywhere, any one who, more thoroughly than he, understands the principles and rules regulating the army system. The facts stated by him are facts, and Col. Rice knows what he is discussing. His opinions and recommendations have a two-fold value by reason of his past relations and experience, and test of army and citizen soldier methods of instruction, practice and rifle competition.

Col. Rice has prepared a manual for the rifle range. I have read it with interest and with profit. It contains much that is good, and much that is new; that which is new is also good. If a man is ambitious to attain success as a rifleman, he will do well to study the Rice Range Manual and Score Record. If a man has already earned his highest insignia and decorations in small arms practice or competitions, he still will get new ideas by reading the manual.

PHILIP READE,  
Capt. 3d. U. S. Infantry.



## Prize Essay—1895.

I.—The following Resolution of Council is published for the information of all concerned :

*Resolved*, That a Prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest ; the subject to be selected by the Executive Council and the Prize awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary on or before September 1, 1895. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.
3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate the *Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.
4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.
5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Nov. 9, 1894, for the Prize Essay of 1895, is

"THE ART OF SUPPLYING ARMIES IN THE FIELD AS  
EXEMPLIFIED DURING THE CIVIL WAR."

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1895 are :

GENERAL S. R. HOLABIRD, U. S. Army.  
GENERAL C. B. COMSTOCK, U. S. Army.  
GENERAL J. W. BARRIGER, U. S. Army.

JAMES FORNANCE,  
*Secretary.*

GOVERNOR'S ISLAND,  
March, 1895.

\*"All officers of the Army and Professors at the Military Academy shall be entitled to membership, *without ballot*, upon payment of the entrance fee. Ex-officers of the Regular Army of good standing and honorable record shall be eligible to full membership of the Institution *by ballot* of the Executive Council.

"Officers of the United States Navy or Marine Corps shall be entitled to membership of the Institution *without ballot*, upon payment of the entrance fee, but shall not be entitled to vote, nor be eligible to office.

"All persons not mentioned in the preceding sections, of honorable record and good standing, shall be eligible to Associate Membership *by a confirmative vote* of two-thirds of the members of the Executive Council present at any meeting. Associate Members shall be entitled to all the benefits of the Institution, including a share in its public discussions, but no Associate Member shall be entitled to vote or be eligible to office."

# Annual Report.

## The Military Service Institution of the U. S.

JANUARY 1, 1895.

*To the Members of the Military Service Institution of the United States.*

GENTLEMEN:—I have the honor, on behalf of the Executive Council, to submit the following report of the operations of the Institution during the year 1894.

The Treasurer's report for the year shows:—

Balance on hand Jan. 1, 1894 (cash and R. R. bond),	\$7056.74
Received during 1894,	\$8041.33
Expended during 1894,	\$7763.93
Balance on hand Jan. 1, 1895 (cash and R. R. bond),	\$7334.14

In September last the Institution lost, by transfer to another post, an officer who for nearly four years had held the offices of Secretary M. S. I. and Editor of the JOURNAL. Reference to the services of Major W. L. Haskin, 1st U.S. Artillery, in these capacities, has already been made in the reports for 1893 and 1894 and can only be reiterated here. The thanks of the Institution are due this officer for the efficient performance of the duties intrusted to him.

The affairs of the Institution continue prosperous; many officers of the Army and National Guard have become members during the year and the papers presented in the JOURNAL have been of a character to still further increase the interest in matters intimately connected with the welfare and safety of our country.

It is particularly desirable that young officers should become members, especially those who have just entered the Army, for

in no other way can they so conveniently keep up a proper reading knowledge of their profession.

The Library has received the usual number of new volumes and now forms a fairly complete library of reference.

The Historical Sketches, which have consumed so much labor both in preparation and presentation, will undoubtedly be completed during 1895. These sketches, when collected in book form, will not only prove of value in themselves, but will have been beneficial also in the stimulus which they have given to further research and the preparation of detailed regimental histories, thereby encouraging a proper pride in regiment and corps.

The gold medal of the Institution for 1894 was awarded to Captain Eugene A. Ellis, 8th U. S. Cavalry, for the best essay upon "Discipline: Its Importance to an Armed Force and the Best Means of Promoting and Maintaining it in the United States Army."

The essays of 1st Lieutenant M. F. Steele, 8th U. S. Cavalry, and 1st Lieutenant E. M. Lewis, 20th U. S. Infantry, received the first and second honorable mention respectively.

The number of competing essays was the largest ever presented in the history of the Institution.

J. M. SCHOFIELD,

*Major General. President M. S. I.*









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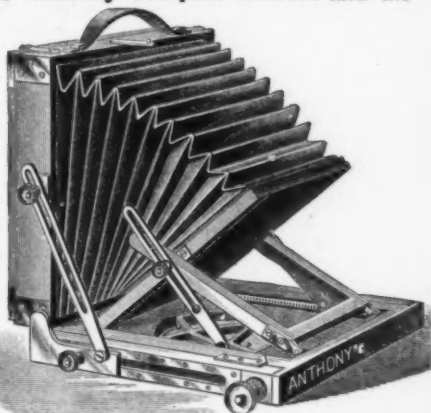
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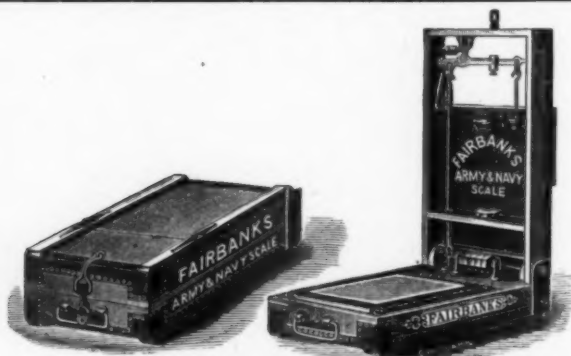
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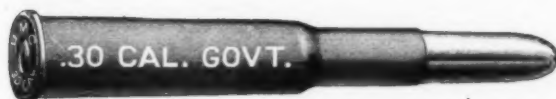


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## THE INSPECTOR GENERAL'S DEPARTMENT.

BY MAJOR J. P. SANGER, INSPECTOR GENERAL, U. S. A.

THE office of inspector general dates from Dec. 13, 1777, although Lieutenant-Colonel Mottin de la Balme, a French cavalry officer, was appointed by congress July 8, 1777, inspector general of cavalry; and on Aug. 11, M. du Coudray, a French artillery officer, was appointed inspector general of ordnance and military manufactures with the rank of major general. It is not probable that either of these officers performed much service as inspectors, for the entire cavalry force consisted of but four regiments, used chiefly as escorts, messengers and orderlies, while the ordnance and military manufactures were as yet unorganized. De la Balme resigned three months and three days after his appointment, and Du Coudray held his position about one month. He was drowned September 15, while attempting to cross the Schuylkill en route to army headquarters as a volunteer.

On October 26, 1777, General Washington assembled a council composed of fourteen general officers which met on the 29th, and among other questions submitted to it, considered the following: "Will the office of inspector general to our army, for the purpose principally of establishing one uniform set of manœuvres and manual, be advisable, as the time of the adjutant general seems to be totally engaged with other business?" It was apparently the intention that each member of the council should submit his views in writing, but only those of General Sullivan on the subject of the inspectorship have been preserved, and in regard to that he wrote:

"Such an officer will answer an exceedingly good purpose, provided a person who is well versed in the manœuvres has the appointment, and the major and brigadier generals themselves will take more pains to teach their men to move in large bodies, and perform such manœuvres as the inspector general will recommend. If the person appointed should only be acquainted with the trick of parade of a single company or regiment, and has not extended his ideas to the movements of armies, it will be rather a disadvantage than benefit to the army."\*

The final decision of the council, which every member signed, was that "such an officer was desirable, the manual or regulations to be first agreed upon by the commander-in-chief, or a board of officers appointed for the purpose." General Conway, one of the members, was born in Ireland, but educated in France and had served many years in the French army. He came over on an engagement with Messrs. Dean and Franklin, who described him as a soldier of high character and abilities, and one of the most skillful disciplinarians in France. He was commissioned brigadier May 13, 1777, joined the army under Washington who assigned him to the command of a brigade, and participated in the battles of Brandywine and Germantown, and the operations around Philadelphia. He now be-

\*Original manuscript, State Department.



came an aspirant for the position of inspector general, and addressed letters to congress proposing a plan of organization.

These letters were referred to the board of war, which, on December 12, 1777, reported to congress that they had considered the letters, and that it was expedient to the promotion of discipline and to the reformation of the various abuses which prevailed in the different departments, that an appointment should be made of an inspector general, whose duties should be to determine, with the consent of the commander-in-chief, the instruction, discipline, strength, and condition of all organizations, their accounts, rations, arms and equipment, and the capacity of all officers; his reports to go to the board of war, and a copy to the majors of regiments, and all complaints and grievances to congress.\*

It was further resolved that two inspectors general be appointed, which resulted in the election of Brigadier General Thomas Conway with the rank of major general: the other was not chosen.

Fortunately for the discipline of the army and the conduct of military operations, this plan of administering the inspectorship was not carried out. Its effect was to put the inspector general in direct communication with congress and the board of war. In the hands of Conway, and the board of war as then constituted, such a weapon would have been irresistible, and Washington appears to have fully appreciated the danger. On the 2d of January, 1778, he wrote to the president of congress opposing the appointment of Conway and transmitting an extract from the proceedings of the council of generals, in regard to which he wrote:

"The enclosed extract from the proceedings of a council of general officers will show the office of inspector general was a matter not of such modern date as General Conway maintains it to be, and that it was one of the regulations in view to reform the army.

"The foreign officers who had commissions and no commands, and who were of ability, were intended to be recommended to execute it, particularly the Baron d'Arendt with whom the idea originated, and whose capacity seemed to be well admitted." †

The baron was a Prussian officer and colonel of the German regiment, and served as aide-de-camp to Washington. Conway held the office of inspector general until April 28, 1778, when he resigned.

Although Washington did not employ Conway as inspector general, he still gave heed to the duties of the office which ever held a high place in his mind. In a letter of January 28, 1778, to the congressional committee, which visited his camp at Valley Forge, to mature a plan for the better administration of the army, he wrote:

"In an army, like ours, the office of inspector general, principally for the purpose of instituting and carrying into practice an uniform system of manual and manœuvres, must be extremely useful and advantageous. A number of assistants to this office will be required, as one man would be incapable of superintending the practice of the rules laid down, throughout the army; and unless this were carefully done, it would be of little avail to establish them. It would be proper, in my opinion, to have one to each

\* Journals of Congress.

† Writings of Washington, Vol. VI.

brigade; the benefits resulting from which would greatly over-balance the consideration of expense."\*

In the meantime, December 1, 1777, Lieutenant-General Baron von Steuben arrived at Portsmouth, N. H., and proceeded to York, Pa., where he tendered his services to congress as a volunteer. He commenced his military life when a mere child, as the companion of his father, an engineer officer, and became aide-de-camp to Frederick the Great. Congress conferred on him the rank of captain by brevet, in order to guard against any inconveniences which might result were he taken prisoner, and he joined the army under Washington at Valley Forge, February 23, 1778.

Shortly after his arrival he accepted the appointment of temporary inspector and entered on his duties. The condition of the army,—without sufficient arms, clothing, rations, medicines, money, organization, instruction or discipline,—was deplorable in all respects. There was no uniformity, while the short terms of enlistment—three, six, and nine months—kept up a continual flow of men, who, as they left for their homes, carried off with them everything serviceable in their possession. These fluctuations destroyed the significance of divisions, brigades and regiments, which bore no resemblance to such organizations. It was impossible to obtain correct returns of the troops, the arms, supplies, or, in fact, a reliable report of anything. Drill regulations of any kind were unknown; each colonel and general had a system of his own; there was no military code. The interior economy and administration of regiments and companies did not exist; quartermasters obtained supplies and issued them, when their responsibility ceased, while that of the captains was never assumed; hence deficiencies were not known or explained. Officers and men absented themselves at will; desertion was general, and jealousies, bickerings, misunderstandings, insubordination, extravagance, and waste of all kinds prevailed. Unfed, unpaid, insufficiently sheltered, and literally naked, the army presented a picture of inefficiency almost beyond remedy. These conditions naturally suggested to such an experienced officer as Steuben the appropriate remedies, and although many of them were beyond his reach and he labored under the disadvantage of not knowing the English language, he set about his task.

To the defects he could not remedy he paid no attention, but devoted himself to completing the organization, instruction and discipline of the troops. To this end he formed a guard for the general-in-chief of 120 men drawn from the line, which he commanded and instructed in person, and which became a school for the inspectors and other officers. The men were completely uniformed, armed and equipped, and their military bearing and general appearance received much attention. Impressed by their intelligence and aptitude, the short time for preparation, the voluntary and transitory character of the service, and the ill success of other foreign officers who had adhered strictly to European methods, Steuben very sensibly reversed the old system, and, as he says in his memoirs, instead of "eternal manual exercises," the purpose of which was not apparent, but which exhausted the patience of the recruits, he practiced them in simple manœuvres having a palpable object, and in such manner as to make plain

\*Writings of Washington, Vol. VI.

the necessity for elementary drill. The good effects of this plan soon became manifest, and on March 28, about a month after he had reported to General Washington, the latter issued an order announcing that the Baron had "obligingly undertaken the exercise of the office of inspector general of the army," and appointed Lieutenant-Colonels Davies, Brooks, Barber and Mr. Ternant, as sub-inspectors. This order was followed by others requiring colonels and regimental commanders to review and inspect their regiments weekly, brigadiers their brigades fortnightly, and major generals their divisions. The inspectors were held responsible for the discipline of the troops, and that all instruction conformed strictly to that given by the Baron to the model company, and issued by him with the consent of the general-in-chief.

On April 30th, in a letter to congress, Washington explained the ill consequences arising from a want of uniformity in discipline and instruction throughout the army, the necessity for a well organized inspectorship, and what had been done up to that time by Steuben. In the month following he submitted a plan under which the business of the office was to form a system of manual and manœuvres; to prepare all necessary regulations for the government, discipline and arrangement of the army in all its branches; and to see that they were strictly observed. For this purpose the inspectors were to be considered "the instructors and censors of the army in everything connected with its discipline and management." The inspector general to be under the direction of the general-in-chief, his deputies to have charge of the wings or divisions under the major generals commanding, and the inspectors the brigades. He recommended Steuben for inspector general, also General Cadwallader, "of a decisive and independent spirit," Colonel Fleming and the Barons Arendt and Holtzendorf, as assistants.

As a result of this correspondence, congress on May 5, 1778, approved the plan and appointed Baron Steuben inspector general with the rank and pay of major general. It was also resolved, "that there be two ranks of inspectors under the direction of the inspector general, the first to superintend two or more brigades, and the other to be charged with the inspection of only one brigade."

Steuben soon began to experience difficulties heretofore unknown. As long as he was a volunteer inspector without military authority as such, there was no open opposition to his plan of exercises and inspections, to receiving instructions from him personally, or to his practice of turning out the troops for drill which he did at his volition. His appointment as major general, however, caused much ill feeling among those who were below him in rank, and those of the same grade now objected to the privileges and authority previously exercised by him. Washington also, while fully appreciating the benefits to the army that had resulted from his efforts, thought that too much authority might be prejudicial to the inspectorship as well as to discipline, and accordingly issued an order, June 15, 1778, specifying the duties of the inspectors, and requiring all rules and regulations to be first approved by him, and then either published in orders or communicated by his direction.

All exercises and manœuvres were to be executed under the immediate

orders of the several commanders, the inspectors acting as assistants, and the manœuvres, which the Baron had practiced, were only to take place after orders specially issued, in each case, by the general-in-chief.

Thus the extensive powers exercised by Steuben when his office was first established, and which were considered necessary in view of the exigencies of the case, were brought within proper limits, and the safety of the inspectorship insured. That it would have been overthrown had not Washington placed a wise curb upon the ambition of the inspector general, or had he conceded to him the power of enforcing subordination, there can be little doubt. As stated by Alexander Hamilton, at that time aide-de-camp to Washington, in a letter of June, 1778, to Mr. Duer, a member of congress from New York: "The novelty of the office excited questions about its boundaries; the extent of its operations alarmed the officers of every rank for their rights. Their jealousies and discontents were rising to a height that threatened to overturn the whole plan."

Steuben continued at Washington's headquarters where he was most useful. In the execution of his duties he met with obstacles which, according to Hamilton, "were thrown in his way by many of the general officers, incited to it by Lee and Mifflin," and inasmuch as he had not been able to induce congress to adopt his ideas of the inspectorship, he now insisted on a permanent command, and seemed determined to leave the service altogether if it were not given him. Provided with a letter from Washington to the president of congress, the Baron laid his case before that body. But he was not successful and accordingly devoted himself again to his duties as inspector general.

Shortly after his arrival at Valley Forge, congress appointed a committee to confer with him. To this committee he submitted a project in which he discussed the causes which led to the establishment of the inspectorship, and in what manner it could best be made to conform with the genius of the people and the constitution of the army.

Reasoning from the relation of the inspectors general of France and Prussia, who were accountable to the king alone, he thought the inspector general should be answerable to the board of war, to which and the commander-in-chief, he was to make a report of his inspections. In the event of differences between the commander-in-chief and the inspector general, congress was to decide.\* In other words, the inspector general was to be a staff officer of the board of war, and only in a qualified way under the control of the commander-in-chief.

This plan was referred to a committee of congress which reported that, after fully considering it and consulting with the Baron, they recommended—in the form of resolutions—that there should be one inspector general with the rank of major general, an assistant inspector general with the rank of brigadier general, sub-inspectors to be colonels and each to have the troops of three or four states, the offices of brigade major and brigade inspector to be united, and the regulations of the department to be as proposed in the plan. The second resolution, among other things, authorized inspectors to have the troops under arms whenever they desired. The

\*Journals of Congress.

eighth resolution made the inspector general and his assistants subject to the orders of congress, the board of war, and the commander-in-chief. The tenth resolution provided that every officer and soldier who so desired should have the privilege of presenting any complaints to the inspector.\*

The report was referred to Washington August 20, who, with his usual penetration and sagacity, discussed the merits and weak points of the proposed plan and report.† He saw that while it embraced many of the fundamental principles of inspections, it was fatally defective in establishing direct communication between the inspector general and the board of war; in making the inspector general independent of the commander-in-chief and the sub-inspectors independent of the subordinate generals. His letters and observations, together with the report, were received in congress September 15, whereupon it was "Ordered that the report and observations be referred to the committee of arrangement, and that they be directed to prepare a plan of regulations for the inspectorship, agreeable to the said report and observations."‡

On Thursday, February 18th, the committee made its report, whereupon the following plan of organization and management for the department of the inspector general was agreed to: There should be an inspector general, who, in all future appointments, should be taken from the line of major generals, and whose principal duty should be to form a system of regulations for drill and manœuvre, service of guards and detachments, and for camp and garrison duty. Together with his assistants he was to review and inspect the troops and receive such returns as the commander-in-chief or officers in command might direct, reporting all defects and deficiencies to the officers ordering the inspection and to the board of war; all regulations whatsoever to be finally established by congress, but the exigencies of the service requiring it, temporary regulations might be introduced by the inspector general, with the approval of the commander-in-chief, such regulations to be communicated to the army by the adjutant general, and transmitted at once to the board of war for the action of congress; to be as many sub-inspectors as the commander-in-chief or commander of a detachment, in view of the strength and situation of the army, might deem necessary, to be taken from the line of lieutenant-colonels and to receive their instructions relative to the department from the inspector general; one inspector to each brigade to be taken from among the majors and the office to be annexed to that of brigade major; that all the officers of the inspectorship having appointments in the line should retain their rights of command, succession, and promotion, but they should not exercise command except on particular occasions and by special assignment of the commander-in-chief; to be exempt from all duties except those of their office; the inspector general to be subject to congress and the commander-in-chief only; and the sub-inspectors to be also subject to the orders of the division and brigade commanders on whose staff they were serving §

\* Journals of Congress.

† Original Manuscript in State Department.

‡ Journals of Congress.

§ Journals of Congress.

From this it appears that the views of Washington had been given due weight, and that the dangers to discipline, as well as those which threatened the inspectorship, had been carefully avoided.

On March 25, Steuben submitted to congress a system of drill regulations for the infantry, which, on the 29th, were approved and adopted.

In the library of the war department one of the few remaining copies of this book may be seen. It was the first important result of the inspectorship, and was of inestimable benefit to the army. The scope of this sketch will not permit an analysis of these regulations, but it may be remarked that they partook of the Baron's very practical ideas in regard to the character of the instruction most needed to prepare the troops for the field. Many of the rules prescribed and the customs resulting from them are still observed in the army; others might be revived with benefit to discipline.

The regulations having been formally approved, Washington, on April 12, May 4, 12, 22, and June 20, 1779, issued orders making the inspector general and his assistant responsible for their observance. The sub-inspectors when their divisions were detached were to perform the duties of adjutant general, and the new duties of the brigade majors, which were in effect the same as outlined in Steuben's plan, were defined. In reference to inspections the brigade majors received their instructions from the inspector general, and from the sub-inspectors of the divisions to which they belonged. It was doubtless in pursuance of this idea, of uniting the duties of adjutant general and inspector general that congress on June 22, "Resolved, That the adjutant general for the time being, be also assistant inspector general."

The organization of the inspectorship being now complete, Washington on July 1, issued an order prescribing a monthly inspection of the whole army, and directing that at these inspections the inspectors be furnished, by all company commanders, with exact returns of the troops and of all government property since last inspection as well as of that on hand. These returns were consolidated into division returns for the information of the division commanders. "With what strict scrutiny were the inspections made" relates William North:

"I have seen the Baron and his assistants seven long hours inspecting a brigade of three small regiments. Every man not present must be accounted for; if in camp, sick or well, they were produced or visited; every musket handled and searched, cartridge boxes opened, even the flints and cartridges counted; knapsacks unslung and every article of clothing spread on the soldier's blanket, and tested by his little book, whether what he had received from the United States within the year was there, if not, to be accounted for. Hospitals, stores, laboratories, every place and every thing was open to inspection and inspected, and what officer's mind was at ease if losses or expenditures could not, on the day of searching, be fully and fairly accounted for? The inspections were every month, and wonderful was the effect, not only with regard to economy, but in creating a spirit of emulation between different corps. I have known the subalterns of a regiment appropriate one of their two rations to the bettering the appearance of their men, but this was at a later period of the war, when supplies and payments were more ample and more regular."\*

On January 12, 1780, congress abolished the mustering department and

\*Kapp's Life of Steuben.



transferred the duties to the inspector general's department. The effect of this was to simplify and greatly improve the administration and efficiency of the army. A division of duties so closely united as to be almost identical, among two sets of officers entirely separated by official lines and having a different responsibility, resulted in much friction and confusion and added to the difficulties of command. That the change was in the interest of economy cannot be doubted, and on May 7, Steuben submitted a plan which included the duties of both departments. After considering this plan, Washington on July 14th addressed the following to the president of congress:

"I enclose a plan which, in conjunction with the inspector general, I have framed for the consideration of congress. It is indispensable the department should be put in full activity without loss of time—the speedier the decision the better. A large additional allowance, at least nominally, for the inspectors, is proposed, but it is a very imperfect compensation for the additional trouble, and unless some extra privileges and emoluments attend the office, it will not be undertaken by officers of rank and abilities." \*

This plan, expressing the concurrent and deliberate views of Washington and Steuben, should be given in full, but it is so lengthy that only a synopsis is permissible.

It provided for an inspector general with the rank of major general, to be taken from the line of major generals, with two aides and two secretaries; an assistant inspector general, to be adjutant general of the main army; an inspector to each division, one to the corps of cavalry, one to the artillery, one to the independent corps, garrisons, and to the militia in service, to be taken, when practicable, from the line of colonels and lieutenant colonels, and one to each brigade with the rank of major. The drill regulations and those prescribing discipline, service of guards and detachments, camps and garrisons, to be framed and their execution superintended by the inspector general of the army; the assistant inspector general to act as inspector general during the absence of the latter, and to perform the duties of adjutant general; the inspectors and sub-inspectors to act as adjutants general of the divisions and brigades, receiving their instructions in reference to inspection duty from the inspector general and assistant inspector general; the troops to be reviewed and mustered by the inspector general and his assistants monthly, noting the number and condition of the men, their discipline and drill, the state of the arms, equipments, clothing, rations, etc., rejecting all unserviceable recruits, discharging or transferring to the invalid corps all men disabled in the service, and reporting all abuses, neglects and deficiencies to the commander-in-chief, the commander of the organization, and to the board of war. The returns of men and material, as required in Washington's order of July 1, were continued, as were the other duties and responsibilities. The inspector general in all that related to inspections was subject only to congress, the board of war, and the commander-in-chief; all other inspectors to the commanders with whom they served.

This plan having been discussed, congress, on September 25, voted that:

\* Original Manuscript in State Department.



"Whereas, the institution of the department hath been found of great utility to the armies of these United States; and experience hath shown that it may be rendered still more useful by an extension of its powers and objects, therefore,

"Resolved, That the former establishment by a resolution of February 18, 1779, and all subsequent resolutions relative thereto, be repealed, and the department hereafter have the following form, powers and privileges."

Then follows the plan proposed by Washington and Steuben, with some changes, and Steuben was continued as inspector general, and authorized to appoint all officers necessary to its execution, they being first approved by the commander-in-chief.

Considering the short time the inspectorship had been established the plan was as satisfactory as could be expected, but was a disappointment to the Baron. Nevertheless he continued actively at work and devised many remedies for the abuses which prevailed throughout the army. That they were numerous, and that Washington believed in the efficacy of frequent inspections, his correspondence fully proves.

On the surrender of Cornwallis, Steuben recommended a reduction in the number of inspectors and proposed some other changes. Accordingly, on January 10, congress authorized one inspector general, to be appointed from the general officers, with one secretary and two aides to be taken from the line; one field officer of the line to be inspector of each separate army, with \$80 per month additional pay, and to be allowed to select a captain or subaltern to assist him in the duties of his office, with \$10 per month additional pay. The inspectors in the execution of their offices were made subject only to the orders of congress, the secretary of war, the commander-in-chief, or commanding officer of a separate army. The authority and duties of the inspector general and his assistants continued unchanged.

With the capitulation of Cornwallis the operations of the main army may be said to have terminated. Attention was now concentrated on the southern army, and every effort made to render it efficient, but with little success. The dishonesty and extortion which had characterized the methods of supplying the troops still continued, and finally engaged the attention of congress, which, on May 7, 1782, provided for the appointment of inspectors of contracts and supplies for the two armies, who were to report any fraud, neglect of duty, or other misconduct by which the public property was wasted or expense unnecessarily incurred.

Under these resolutions Colonel Ezekiel Cornell of Rhode Island, was made inspector of contracts for the main army, and Colonel Francis Mentges of the 5th Pennsylvania regiment, the inspector of the southern army. Both of these officers were acting as inspectors of the aforesaid armies respectively.

The Peace of Paris was signed January 20, 1783, and a cessation of hostilities was proclaimed by Washington to take effect April 19th.

On December 23d Washington resigned his commission in the army and retired to private life. The same day he addressed a letter to Steuben, the last he ever wrote as commander-in-chief, in which he said:

" \* \* \* I wish to make use of this last moment of my public life to signify in the strongest terms, my entire approbation of your conduct, and to express my sense

of the obligations the public is under to you, for your faithful and meritorious services."

On December 30, 1782, congress passed a resolution complimentary to Steuben, and on March 24, 1784, he sent in his resignation. In accepting it congress passed a resolution of thanks, "for his great zeal and abilities," and ordered "that a gold hilted sword be presented to him as a mark of the high sense entertained for his character and services." Washington had previously written in reply to the Baron's inquiry, "whether or no he considered the department of the inspector general necessary to the army, and whether it had been conducted according to his wishes," as follows:

"I give it as my clear opinion that it has been of the greatest importance for reasons too obvious to need enumeration, but more especially for having established one uniform system of manœuvres and regulations in an army composed of the troops of thirteen States, (each having its local prejudices) and subject to constant deviations and interruptions from the frequent changes it has undergone. It is equally just to declare that the department under your auspices, has been conducted with an intelligence, activity and zeal, not less beneficial to the public than honorary to yourself, and that I have abundant reasons to be satisfied with your abilities and attention to the duties of your office during the four years you have been in service."\*

Steuben did not return to Europe, but made his home in Oneida County, N. Y., where he died of paralysis, November 28, 1794, at the age of sixty-five years.

When the army was disbanded it was divided into a northern and southern force. The main body of the northern army was stationed along the Hudson river from Newburg to West Point. On the 19th of March, 1784, Steuben appointed Major William North, his aide-de-camp, inspector of these troops, and the appointment was confirmed by congress April 15, when he was made "inspector to the troops remaining in the service and pay of the United States," which consisted at the end of April, of 433 infantry and 80 artillery. On the 2d of June congress ordered all the troops in service to be mustered out, except 25 privates to guard the stores at Fort Pitt, and 55 at West Point. Under this act General Knox was disbanded and the command of the "army" devolved on Captain and Brevet Major Doughty, of the artillery.

From this date to July 31, 1787, the army was increased and reduced several times; at the latter date it consisted of one regiment of infantry and four companies of artillery.

On June 25, 1788, it was resolved in congress, "That the office of inspector of troops in the service of the United States immediately cease, and be discontinued, and that the secretary of war report what mode may be most eligible for having the troops inspected in the future."

In accordance with these instructions he wrote, July 3, 1788, to the president of congress as follows:

"Agreeably to the order of congress of the 25th ultimo, I have the honor to report to your Excellency that the recruits at present raising in Connecticut, New Jersey and Pennsylvania, will be mustered and inspected previously to their marching by Mr. Stagg, who is employed in this office and is adequate to the business.

\* Writings of Washington.

"That I conceive the troops on the frontiers may be mustered and inspected by the majors on oath."

Mr. John Stagg was the chief clerk of the war department, and an ex-officer of the Continental army. He was brigade-major of Conway's brigade, and of course had performed the duties of inspector. Under these instructions the majors of the regiments acted as inspectors, but Messrs. Stagg and Francis Mentges were inspectors under the secretary of war.

The war department was established August 7, and on September 29 congress enacted a law "to recognize and adapt to the constitution of the United States, the establishment of the troops raised under the resolves of the old congress."

By the act of April 30, 1790, the infantry regiment had three battalions of four companies each; the artillery battalion four companies; a total of 1216 men. Section 4 authorized an inspector "to inspect said troops."

Owing to Indian hostilities a second regiment of infantry was added March 3, 1791, bringing the authorized aggregate strength of the army to 2232. On March 4, Arthur St. Clair of Pennsylvania was appointed major general, and replaced Harmar in command of the Northwestern Territory. The inspector of this army was Mr. F. Mentges, already mentioned.

Owing to the failure of his expedition against the Indians, St. Clair resigned March 5, 1792, and on the same day congress added three more infantry regiments for a term not to exceed three years. One of these regiments was given the unique organization of two battalions of infantry, and one squadron of four troops of light dragoons.

Provision was made for a general staff in which there was an "adjutant to do also the duty of inspector, and a brigade major to act as deputy." Colonel Winthrop Sargent of Massachusetts, acting assistant adjutant general of St. Clair's army, was appointed adjutant and inspector but declined, assigning as a reason that the office was not attended with sufficient rank.

General St. Clair was succeeded by General Wayne, and the army was organized by Washington into a legion and four sub-legions, making the aggregate strength of the whole 5414.

The legionary staff included one adjutant and inspector, and that of the sub-legion one brigade-major and inspector. As Colonel Sargent declined his appointment General Wayne appointed Captain Henry de Butts, of the 4th sub-legion, acting adjutant and inspector, March 17. He was relieved by Captain Edward Butler of the 4th sub-legion, who acted until relieved February 23, 1793, by Major Michael Rudolph, of the light dragoons, who was appointed adjutant and inspector of the army. He resigned July 17, 1793, and was succeeded by Captain Edward Butler, who held the position until May 13, and was followed by Major John Mills, 2d sub legion.

The act of March 3, 1795, provided for "an adjutant general to do also the duty of inspector," and gave additional compensation to the brigade-majors.

The act of May 30, 1796, provided for one inspector to do the duty of adjutant general, and terminated the existence of the legion. On February

27, Major Thomas Cushing, 1st infantry, was appointed inspector of the army and performed the duties of adjutant general.

The act of March 3, 1797, repealed the foregoing act, and provided for one brigadier general, to choose his brigade-major from the captains of the line. As Major Cushing had not relinquished his rank in the line upon receiving the commission of inspector, he continued to perform the duties of his office by detail.

By the act of May 22, 1798, the brigadier general was authorized to choose his brigade-major and inspector from among any of the commissioned officers in the line of the army.

About this time our difficulties with France assumed a threatening aspect and congress authorized a provisional army, the organization of which followed the principles observed towards the end of the Revolution. The troops formed brigades and divisions; the adjutant general was deputy to the inspector general; the duties performed by the inspectors were generally such as devolved on them during the Revolution and since. All inspectors were given additional pay.

On July 3d Washington was made commander-in-chief, and on the 18th Alexander Hamilton was appointed inspector general with the rank of major general. In a letter addressed to the secretary of war, July 4, Washington gave his views at length respecting the importance of the general staff to the welfare of the army.

Referring to the inspector general he wrote:

"If the inspector general is not an officer of great respectability of character, firm and strict in discharging the duties of the trust reposed in him, or if he be too pliant in his disposition, he will most assuredly be imposed upon, and the efficient strength and condition of the army will not be known to the commander-in-chief; of course he may form his plans upon erroneous calculations and commit fatal mistakes."

Hamilton selected as his aides Captain George Izard and Lieutenant Ethan Allen Brown. Jacob Brown, who became a major general in 1812 and commander of the army, was his military secretary.

A few days after receiving his commission, July 28, Hamilton entered upon his duties, which far exceeded in their variety and scope those of any other officer of the army. Nothing escaped his attention. He was practically at the head of the war department and chief of staff, both the secretary of war and Washington placing unbounded confidence in his abilities, his patriotism and integrity. The scope of this sketch will not allow a recital of the many important services rendered by Hamilton and his assistants. On February 4 he was invested with the command of all the troops along the northern lakes and in the Northwest Territory. Among the many objects which he had under consideration was the plan of a military academy, which had also been suggested by Steuben, and had repeatedly received the consideration of the government, but without result.

He submitted his plan to Washington who replied under date of December 12, 1779, commending the idea but declining to make any observations on the details of the plan.

This, the last letter written by the "Father of his country" before his death, which followed two days later, suggests the reflection that the last

letter written by him at the close of the Revolution, and just before resigning his commission, was addressed to the inspector general of the army, the Baron Steuben. Like Hamilton, Steuben had been appointed to his office at the request of Washington, and both shared in the fullest degree his confidence and affection.

As our difficulties with the French Republic now seemed in the way of adjustment, congress, May 14, 1800, reduced the army. On May 13 Hamilton had requested leave to resign his commission June 1st, but this was not granted, as it was thought expedient that the larger bodies of troops at different stations should be mustered out by him in person. His resignation was finally accepted June 15. He, as well as Steuben, was elected president general of the Society of the Cincinnati.

On the resignation of Hamilton, Major Cushing of the 1st infantry, who had been inspector and adjutant general before him, and who was a division inspector of the provisional army, once more resumed the office of inspector of the army. He continued to fill the office by detail until congress re-established it in 1802. The office of adjutant general having been discontinued and the reduction of the army completed, the duties which had devolved on him were transferred to the inspector, and the duties of inspection prescribed in orders from the headquarters of the army of August 19, 1800.

On November 30 the country was divided into twelve districts, to be commanded by regimental and battalion commanders. Musters and inspections were to be made monthly by the district commanders when the regular inspecting officers could not attend. The order is noteworthy in prescribing that "the muster and inspection of a garrison should not be made by any officer belonging to it."

On the resignation of Hamilton, Brigadier General James Wilkinson became the senior officer of the army and so remained until March 27, 1812. Through all this period he had immediate command of the army, the headquarters of which were at various points, depending on his movements. The adjutant and inspector of the army accompanied him or not, as might be directed, and performed his duties generally under his orders, although sometimes employed by the secretary of war.

The injustice of assigning to an officer detailed from the line, without extra compensation, the arduous duties of adjutant and inspector, induced congress on March 16, 1802, to again establish that office by law, and Major Cushing was appointed to it March 26, and held the position to September 7, 1805. Meanwhile, April 1, 1802, he was promoted lieutenant colonel of his regiment.

Under the act of April 12, 1808, the army was increased to 9921 aggregate, and two inspectors to be taken from the line were authorized. On April 2, Colonel Cushing was succeeded by Major Abimael Nicoll of the artillery.

From the close of the Revolution to the year 1808, the army was subjected, as has been shown, to many changes. There were no printed regulations other than those prepared by Steuben. Efforts had been made by Hamilton, Pinckney and others, to revise the drill books and to compile

regulations, but their work was not published. The systems which prevailed at the close of the Revolution continued, modified by such regulations and orders as circumstances suggested.

In February, 1810, Colonel Alexander Smyth of the regiment of riflemen, compiled a system of infantry exercises and manœuvres, chiefly from French sources, which he was directed to test with the troops in camp near Washington, "there being," so says the order, "no established system for the army of the United States."

Owing to the difficulties growing out of the Napoleonic wars, the refusal of the British to evacuate the posts surrendered by the Treaty of Paris, and the depredations and insults of her cruisers, congress, on December 24, 1811, increased the army. The staff included one inspector general with rank of brigadier general, with two assistants to be taken from the line of lieutenant colonels.

On May 4, 1812, the following regulations defining the duties of the inspector general were issued by the secretary of war :

" \* \* \* It will be the duty of the inspector general to organize the army ; to superintend and enforce discipline ; to visit and inspect camps, cantonments, quarters, prisons, places of arms and hospitals ; to make stated and unexpected inspections of troops, arms, equipments, clothing, ammunition and horses ; to make inspections, returns, and confidential reports relative to the state and discipline of the army ; to designate men and horses unfit for service or the fatigues of war, that the former may be discharged or sent to garrisons and the latter sold ; to examine the books of quartermasters, paymasters and companies, and ascertain the balances ; and to prescribe forms of returns exhibiting all the wants of the army."

These regulations are a summary of the duties which, since its establishment, had gradually devolved upon the department.

On May 16 the president was authorized to appoint from the captains and subalterns of the line, one sub-inspector to each brigade with the additional monthly pay of twenty-four dollars.

On June 18 war was declared against Great Britain, and on the 26th the army was given a more perfect organization, comprising a general staff, medical staff, ordnance department, quartermaster's department, corps of engineers, four regiments of artillery, two of dragoons, one of riflemen and 25 of infantry, an aggregate of 35,752. The country was divided into nine military districts, each with a district staff, which included an inspector. General Dearborn was the senior officer and commanding general during the war.

By the act of July 6, 1812, the president was authorized to appoint to any army of the United States other than that in which the inspector general was serving, one deputy inspector general to be taken from the line with increased pay, and such number of assistant deputies as the service might require.

On July 6 Colonel Smyth was appointed inspector general, and on July 14 the secretary of war issued instructions merging, temporarily, the offices of adjutant and inspector general with the adjutant general's department, the duties of both to be performed under the direction of the adjutant general, to whom Major Nicoll was appointed assistant. Captain William King



of the 15th infantry was made assistant to the inspector general. In September General Smyth was given a brigade in the army along the Niagara River, commanded by Major General Van Rensselaer of the New York militia. On the resignation of that officer after the battle of Queenstown the command passed to General Smyth.

The act of March 3, 1813, organizing the general staff, provided that the adjutant general's and inspector general's departments should consist of one adjutant and inspector general with the rank of brigadier general; 8 adjutants general and 8 inspectors general with the brevet rank, pay, etc., of colonel; 16 assistant adjutants general and 16 assistant inspectors general with the brevet rank, pay, etc., of majors, to be taken from the line or not as the president might deem expedient. The president was also empowered to assign one of the brigadier generals to the principal army to act as adjutant and inspector of such army. As this act discontinued the offices of adjutant general and inspector general, it was held that General Smyth, having no commission in the line, was disbanded and no longer an officer of the army. He sought relief from congress, but was unsuccessful and ceased to be an officer March 3, 1813. The most notable service rendered by him while inspector general was the preparation of regulations for the field service, manœuvre and conduct of infantry, a copy of which may be seen in the library of the war department.

On March 12 Brigadier General Zebulon M. Pike was appointed adjutant and inspector to the army commanded by General Dearborn, but was killed by the explosion of a mine in the attack on the British fortifications at York, Upper Canada, April 13th.

From the death of General Pike to May 19, 1814, the office of adjutant and inspector general of the army remained vacant, the affairs of the two branches being in charge of Colonel Nicoll, inspector general, and Major C. K. Gardner, assistant adjutant general, respectively.

On May 19 Brigadier General W. H. Winder was appointed adjutant and inspector of the army, and chief of staff to the northern army; on July 2 he was assigned to the command of the 10th military district. On the reduction of the army in June, 1815, he retired from service and resumed the practice of the law at his home in the city of Baltimore. He died May 24, 1824.

Meantime Colonel A. Y. Nicoll, who had been in charge of the inspector's office in the war department, resigned June 1, 1814, and was succeeded by Colonel John R. Bell, inspector general, who was appointed major and assistant inspector general July 29, 1813. On November 22, 1814, Mr. Daniel Parker, of Massachusetts, the chief clerk of the war department, was appointed adjutant and inspector general of the army.

On the reduction of the army in 1815 the 8 inspectors general and 16 assistant inspectors general were discharged and four brigade inspectors, to be taken from the line of the army, substituted. No provision was made for continuing the office of adjutant and inspector general of the army, but under the discretion given the president he retained provisionally one adjutant and inspector general, and other staff officers. In March the ten military districts were replaced by nine military departments, forming a



northern and a southern division, each division and department having an inspector generally selected by its commander.

On December 27 the secretary of war suggested to the military committee of the House the expediency of providing by law for the staff appointments provisionally retained by President Madison. This led to the act of April 24, 1816, organizing the general staff, which recognized and made permanent those officers, and provided for one adjutant and inspector general of the army, one inspector general of each division, and an assistant inspector general to every brigade to supersede the inspectors authorized by the act of March 3, 1815, and to be selected from the line of the army or from civil life, with the rank, pay and emoluments, provided by the act of March 3, 1813. Colonels Hayne of the dragoons and Wool of the infantry were announced as inspectors general, and Captains J. M. Davis, Wm. McDonald and G. H. Manigault, of the infantry, Francis S. Belton, formerly of the dragoons but now in civil life, and John Biddle of the artillery, as assistant inspectors general.

By the act of April 14, 1818, the pay of division inspectors was made equal to the pay of division adjutants general. The administration of inspectors continued unchanged until October, 1820, when, by orders, all assistant inspectors general were placed under the division commanders acting through the division inspectors.

By the act of March 2, 1821, the army was reduced and reorganized. The office of adjutant and inspector general was abolished, and but two inspectors general, with the rank, pay and emoluments of colonels of cavalry, authorized. Colonels Wool and Gadsden (the latter appointed October 1, 1820, but not confirmed) were continued as inspectors. It was their duty to make a complete annual inspection of the army under the orders of the general commanding, the troops, posts and other establishments, being equitably divided between them.

On May 17, 1821, an order was issued by the president substituting an eastern and western department for the two divisions into which the country was divided in 1815. In August Colonel Gadsden was appointed adjutant general, and in November, Major S. B. Archer of the artillery was appointed to succeed him.

In December the inspections were specialized, the infantry being assigned to Colonel Wool, and the artillery, arsenals, foundries and manufactories of arms, to Colonel Archer. This was a departure from the practice previously observed, under which there was no division of inspections according to the previous service of inspectors.

During the years 1823 and 1824 additional duties were imposed on inspectors in reference to returns, reports, accounts, statements and inventories of public property, and they were held responsible for all estimates for supplies, which were to be made on consultation with post commander. When not engaged inspecting, they were required to take station at army headquarters.

On March 2 the order specializing the inspections was revoked, and the two inspectors were directed to alternate in the annual inspections which were to be made under the orders of the commanding general. No reasons

for this change are given in the order, which was doubtless issued to more perfectly equalize the duties. The commandant of engineers was made inspector of the military academy.

By the act of March 3, 1825, authorizing the sale of unserviceable ordnance, arms and military supplies, congress designated inspectors general as primarily the proper officers to inspect public property with a view to its elimination from service. By Par. 4 of G. O. 58, series of 1825, such inspections were to be "made by an inspector general when practicable."

On December 11, 1825, Colonel Archer died and was succeeded, December 31, by George Croghan, of Kentucky, formerly lieutenant colonel of the 15th infantry and renowned for the defense of Fort Sandusky, Ohio, in 1813, against the British and Indians.

In April, 1829, inspectors general were authorized to discharge soldiers on certificates of disability, a power previously exercised by them.

On May 19, 1837, the two great departments were changed into divisions with different limits, and divided into seven geographical departments. To each division one of the inspectors general was assigned as chief of staff, and to perform the duties of adjutant and inspector general. The act of July 5, 1838, having added two assistant adjutants general with brevet rank of major, and four with rank of captain, and required them to perform the duties of assistant inspectors, the two inspectors general were returned to the headquarters of the army, December 13.

On June 25 Brevet Brigadier General Wool was appointed full brigadier, and in December, 1839, was succeeded by Major Churchill of the artillery.

In May, 1842, the following important addition to the duties of inspectors was made by the secretary of war, Mr. John C. Spencer :

" \* \* \* II. It is made the duty of the inspectors general, or officers acting as inspectors, carefully to examine and inspect all supplies and materials procured for the construction of forts, or for harbor and river improvements, and all the means applicable thereto, and the number and description of vessels, boats, machinery and instruments, etc., and they will inquire into all contracts for supplies and materials of all kinds, in the different departments, and whether the articles furnished conform to such contracts, and also into contracts made by the quartermaster's department for the transportation of troops and stores. The results of these inspections will be forthwith reported as provided in Par. 835."

On August 23, 1842, an act of congress abolished one of the inspectors general, but on January 12, 1846, this act was repealed. During this period both inspectors continued in office, and were, for a time, on duty with the army in Mexico.

In August, 1848, G. O. 49 divided the country into two military divisions, the eastern consisting of four departments and the western of five departments. There were in addition two separate departments, Nos. 10 and 11, from which, in October, was formed the third, or Pacific division. This arrangement of the country continued until October 31, 1853, when seven military departments were substituted for it.

Colonel Croghan died January 8, 1849, and was succeeded, January 26, by Captain James Duncan, 2d artillery, who died July 3, and was followed June 10, 1850, by Major George A. McCall, 3d infantry.

In May, on the accession of General Scott to the command of the army the inspectors general were ordered to report to him by letter.

On October 16, General Churchill was assigned as inspector of the eastern division; Colonel McCall of the Pacific division; and Brevet Colonel Samuel S. Cooper, assistant inspector general, to the western division. On December 17 the order was revoked and the inspectors were again attached to army-headquarters, but ordered to inspect the three divisions in regular rotation, after which they were to report in person to the commanding general. Colonel McCall resigned April 29, 1853, and was succeeded by Captain J. K. Mansfield of the Engineers, May 28.

No change in the number of inspectors took place between 1842 and 1861, but on March 6, 1860, Brevet Colonel Joseph E. Johnston of the 1st cavalry was assigned to duty as acting inspector general of the army according to his brevet rank. On May 14, 1861, Colonel Mansfield was appointed brigadier general and was succeeded on the same date by Captain and Brevet Lieutenant Colonel Henry L. Scott of the 4th infantry.

On August 3, 1861, five assistant inspectors general with rank of major, and on August 6 two inspectors general with the rank of colonel, were added by congress.

No change in the number of regular inspectors occurred until 1864, but by the act of July 17, 1862, an inspector general with the provisional rank and pay of lieutenant colonel was provided for each army corps. The names of those appointed under the act will be found in G. O. 181 of 1862.

No change in the organization of the department occurred during the war. In 1861 Colonel Marcy was appointed brigadier general and chief of staff to the Army of the Potomac, and so served to November, 1862. Colonel Sacket was inspector general of that army to 1863, when he was succeeded by Colonel Schriver. Baird, Buford and Totten were general officers commanding troops, while Hardie, Davis, Jones and Van Rensselaer were on duty as inspectors. When not assigned to one of the armies in the field they were under the orders of the secretary of war. Armies, army corps, divisions, brigades, geographical divisions and departments, had inspectors general, assistant or acting assistant inspectors general, usually selected by the several commanders; and all parts of the army were subject to frequent inspections. The number of geographical departments increased, until, in 1865, there were 29 departments forming five divisions, and also a number of districts nearly all of which had inspectors.

On January 22, 1866, the war department published in G. O. No. 5, regulations relating to the inspection service, which prescribed the ordinary subjects of inspection and the general principles to be observed. This order, based on the wide experience of the department up to date, defined the "ordinary duties of inspection" to be

"the condition as to efficiency, discipline, supplies, etc., of bodies of troops, and the resources, geographical features, lines of communication and supply, the military wants, etc., of any section of the country; the military status in any field of operations; the condition and supply of military materials of various classes; the condition of the administrative or disbursing departments of the service; the efficiency and conduct of military commanders and agents; the cause of failure or delay in move-

ments or operations ; of losses by accidents, disasters, etc., and in general, all matters pertaining to the military art or having interest in a military point of view."

In the ordinary discharge of the duties, the sphere of inquiry was thus made to include every branch of military affairs, being defined and limited only in specific cases by the orders issued. This order and the circular of November 2, 1868, are fundamental, and have been the basis of all subsequent regulations and orders affecting the department.

The act of July 28, 1866, fixed the number of inspectors general with rank of colonel at four ; assistant inspectors general with rank of lieutenant colonel at three, and the number with rank of major at two.

In October, 1868, all the inspectors and assistant inspectors general were assigned to divisions and departments except Colonel Schriver, who was placed in charge of the bureau and made inspector of the military academy. Selections for acting inspectors were to be made from the grades of field officers who had served not less than ten years. The inspectors of departments were made subordinate to division inspectors, from whom they were to receive instructions relative to the manner of performing their duties.

The act approved March 3, 1869, prohibited any new appointments or promotions in the department. In April the stations of inspectors were changed, and Colonel Marcy was assigned as inspector general at army headquarters and Colonel Schriver with the secretary of war. At the same time department commanders were ordered to make inspections of the troops and posts in person when practicable.

By an act approved June 8, 1872, the president was authorized to appoint Lieutenant-Colonel Davis to the rank and place he would have had if promoted at the time of Colonel Hardie's appointment. This act increased the number of colonels to five, but provided that there should be no promotion to that grade until the number of colonels was reduced to four.

In October, 1872, the five inspectors general were assigned to stations, but performed their duties under the orders of the secretary of war and general of the army ; the three assistant inspectors general went to the headquarters of the three divisions. Field officers of the line were detailed as department inspectors.

In January, 1873, orders were issued excepting from inspection by department or division inspectors, all engineer establishments, officers or agents. The act of March 3, 1873, established the military prison, and required one of the inspectors general to visit and inspect it at least once in three months.

In April, 1874, the act providing for the inspection of disbursements was passed. It embodied a principle, previously recognized by congress, "that officers detailed for this duty should not be in *any way* connected with the department or corps making the disbursement." This act was at first construed to require monthly inspections, and imposed most arduous duties on all inspectors, who were made responsible for any defalcation or misapplication of the public money or property which "an active vigilance on their part might have detected." It is difficult to imagine a more unjust requirement than this, or one more clearly unintended by the law, which was not designed to prevent frauds or to punish criminals, but to determine the

necessity, propriety and economy of disbursements, and whether officers complied with the law in keeping their accounts and making their deposits. In June, 1874, inspections of disbursements were ordered to be made bi-monthly.

By the act of June 23, 1874, reorganizing the staff of the army, the inspector general's department was to consist of one colonel, two lieutenant colonels and two majors, and not to exceed four line officers to act as inspectors general; and no more appointments were to be made until the number of inspectors general was reduced to five, but no officer then in service was to be reduced in rank or mustered out. This law settled in the affirmative the question as to whether the inspectors general constituted a department, about which there had been some variance of opinion.

In April, 1876, the secretary of war directed the inspector general to report to the general of the army, and to be under him in all matters relating to military control and discipline. In May a reassignment of the inspectors was made, by which two were ordered to army headquarters and the others to the three divisions. Reports of the inspection of troops and military posts were to be forwarded through regular channels to the inspector general's office, and inspectors were ordered to note on such reports the remedies applied, and all superior commanders to endorse on them their action, "for the information of the general of the army." In July the inspections of disbursements were ordered to be made quarterly, and the annual inspection of national cemeteries required by law was assigned to this department, but in 1879 it was dispensed with unless specially ordered.

Congress having declared by the act of June 16, 1874, that the inspectors general constituted a department, and the disproportion between the rank of the senior inspector general, or head of the department, and that of the other chiefs of bureau having been pointed out, the act of December 12, 1878, conferred on the senior inspector general the rank of brigadier general, and fixed the number of colonels at three, lieutenant colonels two, and majors one.

In August, 1879, it was ordered by the secretary of war that every post, station and command of the army should thereafter be inspected at least once each year by division and department inspectors under the direction of their respective commanders, and that in addition, post, station and other permanent commanders should make similar inspections, annually, between September 1st and 5th, and forward the reports to the inspector general's office. This order published a blank form of report which all officers making inspections were required to use.

Between May, 1878, and September, 1879, post schools and post cemeteries were made special subjects of inspection, and inspectors were required to have destroyed in their presence all unserviceable articles having no money value at the place where inspected.

By the act of March 3, 1883, it was made the duty of the inspector general of the army to inspect the Soldier's Home in person once each year.

By the act of February 5, 1885, the department was given its present organization.

March 8, 1885, General Sacket died and was succeeded on the 11th by

Colonel N. H. Davis, who retired September 23, and was followed by Colonel A. Baird.

In August, inspections of disbursements were ordered to be made once every four months; in March, 1886, amendments of the regulations were made prescribing the manner of such inspections, and in June the inspection of the military departments of colleges was assigned.

The hospital corps having been organized by the act of March 1, 1887, orders were issued in August establishing the rules and regulations affecting it, and inspectors general were required to examine into the efficiency of its members and of the company litter bearers.

On August 20, 1888, General Baird was retired, and was succeeded by Colonel Roger Jones the same date. General Jones died January 26, 1889, and was succeeded by Colonel J. C. Breckinridge, January 30, 1889.

In January, 1889, the inspection of the supply division of the war department, and in November the annual inspection of the militia were assigned to the department.

Between 1889 and 1894 many other important orders, regulations and decisions have been issued affecting the duties of the department, which culminated in the amendment of paragraph 955 A. R., by G. O. No. 38, of 1890, which was the same in spirit as G. O. No. 84 of 1879, and G. O. No. 17, of 1882, under which the entire military establishment was to be inspected annually, the public works under engineer officers alone excepted. They however were now included, and remained on the list of inspections to July 5th, when, by G. O. No. 45, of 1892, they were again excepted.

By G. O. No. 23, the bureau of information was established, and shortly after the inspection of the militia passed under the supervision of the adjutant general.

The last important duty assigned the department, is the annual inspection of the national homes for disabled volunteer soldiers, prescribed by the act of August 18, 1894.



## THE SECOND REGIMENT OF INFANTRY.\*

BY LIEUTENANT W. M. WRIGHT, ADJUTANT 2D U. S. INFANTRY.

THE history of the regiment covers such a long period and the records from 1791 to 1815 are so cloudy and incomplete that it is not deemed practicable to give a detailed account of the events of that time.

Besides, there is grave doubt as to whether we have the right to claim the record of the original Second Infantry, that regiment having been consolidated with the First Infantry in the reorganization of March 3, 1815. This sketch will, therefore, be divided into two parts, the first extending from 1791 to 1815, and the second from 1815 to the present date.

### FIRST PART.

The Act of March 3, 1791, added to the army the Second Regiment of Infantry, with the same organization as the regiment then in service, viz.:—a lieutenant-colonel commandant, two majors, eight captains, eight lieutenants, eight ensigns, one surgeon, two surgeon's mates, and eight companies of about 100 men each. Colonel James Wilkinson of the Revolutionary Army, who afterwards became general-in-chief, accepted the position of colonel commandant.

In the fall of this year the regiment was ordered to take the field against the Miami Indians and proceeded to Fort Washington, now Cincinnati, arriving there the middle of September. About the end of October the army under Governor St. Clair commenced a campaign against Little Turtle, chief of the Miamis. On the 4th of November, 1791, about 60 miles from Fort Washington, the Indians, 1500 strong, surprised the troops and put them to flight with great slaughter. The American army numbered 2000, and of these 38 officers and 555 men were killed or missing, and 21 officers and 224 men were wounded, many of whom died. It being impossible for the campaign to continue, the army returned to Fort Washington for the winter.

In May, 1792, the "Legion" became the military organization of the United States and the Second Infantry was called the Second Sub-legion. Under this title it formed a part of General Anthony Wayne's army till May, 1796, and in 1794 was with the command which defeated the Miami Indians so signally at the junction of the Au Glaize and Maumee rivers.

On the 1st of November, 1796, pursuant to the act of May 30 of that year, the Legion was discontinued and the Second Sub-legion became again the Second Regiment of Infantry. For nine years the regiment remained in the Northwest, and in 1805, under Colonel Thomas Butler, was stationed in the South with headquarters at New Orleans. In September, 1814, the regiment was made famous by the gallant defense of Fort Bowyer (now Fort Morgan), Alabama, against overwhelming odds of British and Indians.

\* An abridgment of Lieut. W. M. Wright's History of 2d U. S. Infantry.



Major Lawrence, "as brave a spirit as ever stood in his country's defense," was in command of the post and of 120 of the Second Infantry. He was brevetted for gallantry in this action, and Captains Chamberlain, Brownlow and Bradley, with Lieutenants Villard, Sturgis, Conway, H. Saunders, T. R. Saunders, Brooks, Davis and C. Saunders, were all mentioned by General Jackson in dispatches. Captain John M. Davis of the regiment was made a brevet major for gallantry at the siege of New Orleans.

The regiment went North in the spring of 1815 and was consolidated with the First Infantry by the Act of March 3d of that year, and here the chronicle of the original Second Infantry comes to an end.

#### SECOND PART.

A new Second Infantry was now formed in accordance with the Act quoted above, by the consolidation of the 6th, 16th, 22d, 23d, and 32d Regiments of Infantry, so it would appear that the date of organization of the present regiment would be that of the Sixth Infantry,—namely, April 3, 1808. On the regimental roster for 1815 we find Hugh Brady as colonel, and Henry Leavenworth and Ninian Pinkney as major and lieutenant-colonel respectively.

Colonel Brady entered the service as an ensign of infantry in 1792, was mustered out as captain in June, 1800, colonel 22d Infantry in July, 1812, transferred to the Second Infantry in May, 1815, and was from that time continuously in the service as colonel of the regiment until his death in 1851, at which time he had been a colonel for 39 years, and the colonel of the Second Infantry for 36 years.

Immediately after its organization the regiment was stationed at Sacketts Harbor and Plattsburg, N. Y., and remained, with the exception of a few company moves, at these stations until January, 1822, when the entire regiment was concentrated at Sacketts Harbor. In June, 1822, Colonel Brady, with regimental headquarters and Companies A, B, D, I and K, embarked at Buffalo on the steamboat *Superior* en route to Sault Ste. Marie, where they built a cantonment which was named after the colonel of the regiment which post is still known as Fort Brady. Late in the year regimental headquarters returned to Sacketts Harbor.

From this time until the outbreak of the Black Hawk War in 1832, the record is almost uneventful. The regiment usually occupied two or more of the stations upon the Northern Frontier,—Forts Brady, Howard, Mackinac, Gratiot or Niagara; Madison Barracks, Detroit or Houlton (where a part of the regiment built Hancock Barracks), with frequent interchanges of stations among the companies.

In June, 1832, Companies A, B, D, G, H and I formed a part of the force destined for General Scott's command, then organizing at Chicago for the Black Hawk War, which had been going on for some time with a large balance of killed and wounded against the government. Asiatic cholera broke out while the troops were at Detroit and their sufferings were terrible. As soon as the epidemic had somewhat abated the command moved and in August was at Rock River, in what is now the State of Illinois.

In October, 1832, the battalion returned from the Black Hawk War, and

the companies were at first stationed at Forts Dearborn, Mackinac and Niagara, but in May, 1834. Companies A, B, G and I, were at Fort Brady; C, E, F and K, at Hancock Barracks; and D and H at Fort Gratiot.

In the spring of 1836 the Creek Indians commenced to show signs of hostility, which resulted in sending Companies F and K in May to Fort Mitchell, Ala., near the Creek Agency. As soon as they arrived Captain Dearborn with his command was ordered to escort a party of emigrating Creek Indians to their destination at Irvington, Ala., and in September, General Jesup ordered these two companies to proceed to Lounds County, Ga., for the protection of that and adjoining counties against the depredations of the Indians.

Companies A, D, G and H were sent to Tampa Bay, Fla., from their northern stations the next year, arriving September 21; and in September, 1838, regimental headquarters and the four companies then at Hancock Barracks were also sent there. The entire regiment was now concentrated in Florida and all the companies were most actively engaged in this most arduous duty until the close of hostilities in the spring of 1842. It would be tedious to chronicle the different stations of the regiment, for it was on the move daily, fighting and building posts and roads. Some idea may be formed of the labors of the troops from the fact that over 90 forts and stockades, and 480 miles of road were built by the army in Florida.

In March, 1839, Captain Russell was proceeding in an open boat on the Miami River to Fort Dallas with a portion of his company (I), while the other part was marching by land, when his boat was fired upon by the Indians who were concealed on the shore. Not a man was touched by the first fire, and Captain Russell at once ordered the men to row for the shore and attack the enemy. Being in the bow of the boat he was the first to land and had given but a few brief orders when he was pierced by five Indian bullets, one of which passed through his brain killing him instantly. His subaltern, Lieutenant Woodruff, continued the fight and brought his captain's body to Fort Dallas. Captain Russell was a most popular and efficient officer, and his death was mourned by the entire army.

Lieutenant-Colonel Cummings, for many years in command of the regiment, was promoted to the 4th Infantry, December 1, 1839, and Major Bennett Riley, 4th Infantry, became lieutenant-colonel of the Second. At the end of the year regimental headquarters were at Picolata under Major Loomis, and the regiment was scattered from one end of the territory to the other. Lieutenant-Colonel Riley assumed command of the regiment in April, 1840, and headquarters were moved to Fort No. 12.

In May, Lieutenant Martin, with three men of the regiment, en route from Wakahosta to Micanopy, was attacked by Indians, receiving three wounds. Two of his men were killed and the other brought the alarm to the post. Lieutenant Sanderson, 7th Infantry, started to the rescue but was ambushed and killed with five of his men.

In 1841 Lieutenants Anderson, McKinsty, and Davidson, led an expedition to the St. Johns. For two days and nights they crept towards the Indian camp, which contained 57 of Aluck's band. With a force of but 24 men they routed the Indians and, but for the treachery of their guide,

would have avenged in characters never to be effaced the monstrous cruelties practised upon the defenceless inhabitants of Florida. All of the above-named officers were mentioned in orders by Colonel Worth, commanding in Florida, and in dispatches to the Major General commanding the Army.

In March Lieutenant Alburtis was in command at Fort Russell, near Pilatka. His post was attacked and nearly captured by Halleck Tustenuggee, but Alburtis made a brilliant counter-attack and drove him off with heavy loss. The Second lost half a dozen men killed and wounded.

Early in 1842 the Seminole War began to show signs of coming to an end and the Second was engaged in keeping the enemy on the move and, in doing so had several fights, losing a few men. The troops engaged in this duty were under Major Plympton. On the 25th of January with 80 men of the regiment he gallantly encountered Halleck Tustenuggee on the head of the Hawk River, which runs into Druin's Lake east of St. Johns. A well contested fight ensued which lasted 45 minutes. The enemy retreated, leaving two warriors wounded on the field, one of whom died. One soldier was killed and two wounded. The evidence of blood on several trails leading from the battle ground was a guarantee that some of the Indians had suffered from bullet or buckshot.

In May of this year the regiment embarked on transports at Pilatka and reached New York early in June, en route to their old stations along the lakes. Headquarters, with Companies C, D, F and K, were stationed at Buffalo Barracks, now Fort Porter; A at Fort Niagara; B, E and I, at Madison Barracks; G at Fort Ontario, and H at Plattsburg.

There was no change until 1845, when headquarters and F went to Detroit Barracks, and C, D, E and K, were moved from their Lake Erie stations to Mackinac, Gratiot, Brady and Wilkins, respectively.

Texas was annexed in March, 1845, and in April of the next year diplomatic relations were broken off and war declared with Mexico. General Zachary Taylor, of Florida fame, fought and won the battles of Palo Alto and Resaca de la Palma in May, and in July was on his way to Monterey, at which point the gallant Second was ordered to join him. Major G. W. Allen and Lieutenant J. S. Woods, 2d Infantry, were in both these fights. Lieutenant Woods was afterwards killed at the battle of Monterey while serving with the 4th Infantry.

Headquarters, with Companies D, E, F and K, rendezvoused at Newport Barracks, Ky., August 12, 1846, and reached General Taylor's base of supplies at Camargo on the Rio Grande River, September 20.

Companies A, B, G, H and I, met at Fort Columbus, N. Y. Harbor, embarked September 2d, and reached Camargo October 13.

The entire regiment, except C Company which had been left at Mackinac for some unknown reason, was now concentrated at Camargo under Lieutenant-Colonel Bennett Riley, but arrived too late to take part in the gallant attack and capture of the city of Monterey.

The regiment joined Twiggs' Brigade at Montemorelos, December 17, which, with Patterson's Brigade, was about to start for Victoria as a corps of observation. They were recalled to Monterey on account of an expected

attack by Santa Anna at Saltillo, but this rumor proved unfounded, and on Christmas day, 1846, the regiment was again on the road to Victoria, arriving there after several skirmishes with the enemy along the road.

The regiment left Victoria January 14, 1847, and arrived at Tampico on the 25th, sailing for Lobos Island late in February. On March 2d the fleet of transports and vessels of war weighed anchor at Lobos Island and within a week the entire force landed, without the loss of a single man, on the beach of Sacrificios, a few miles south of Vera Cruz.

The investment of Vera Cruz began at once. Twiggs' Brigade occupied the extreme left of the American line. While it was moving into position, Lieutenant William Alburty, a young officer of the regiment who served with great distinction during the Seminole War, was killed by a cannon ball from one of the Mexican batteries. Lieutenant D. Davidson was wounded at the same time. On the 13th of March the investment of the place was complete. This had not been accomplished except by the heaviest labor on the part of the troops. The Second Infantry, being on the extreme left, had to carry and haul all impedimenta and rations over the sand hills and through "intervening forests and chapperal" as no transportation had yet arrived from the depot at Brazos. Vera Cruz and the Castle of San Juan d'Ulloa surrendered March 28th, after a siege of 15 days. The troops rested until April 8, when, all preparations for a forward movement having been made the army commenced its march to the City of Mexico, the Second being in the leading division under Twiggs.

Santa Anna, with the remnants of his army which had been so thoroughly whipped by General Taylor at Buena Vista seven weeks before, was reported to be at Jalapa. After a most fatiguing march the regiment arrived at Plan del Rio on the 11th, where it encamped to await the arrival of the rear troops. The pass of Cerro Gordo was at the far end of the valley, and here Santa Anna had taken up a very strong position to oppose the further advance of the Americans. His line crossed the National Road, on which Scott must pass, some three or four miles from Plan del Rio.

On the 17th Twiggs' Division was ordered forward on the National Road, and after some heavy skirmishing captured a fortified hill called the Alataya. Lieutenant C. E. Jarvis, 2d Infantry, was wounded in this engagement and several men of the regiment killed and wounded. On the 18th Twiggs was ordered to move forward before daylight and take up his position across the National Road in the enemy's rear so as to cut off a retreat to Jalapa. "After the artillery had been engaged some time, he ordered Riley's Brigade [Lieutenant-Colonel Bennett Riley, commanding brigade and Second Infantry] to move forward through the valley passing to the right of the Telegrafo Hill, turn to the left of the Mexican line and seize the Jalapa road in rear." (Wilcox, p. 287.)

During this movement the regiment advanced under heavy fire from the Telegrafo, and Captain G. W. Patten, 2d Infantry, was shot through the hand by a grape shot. The enemy appeared in force on the sides of the mountain along the base of which the brigade must pass, and opened an annoying fire on its left flank. Riley detached two companies of the Second, one under Captain J. W. Penrose and one under Lieutenant N. H. Davis,

who engaged the enemy in greatly superior numbers, obliging the brigade to form line to the left to assist them. Riley was soon in the enemy's left rear, and General Twiggs ordered the rest of his division to move forward from the crest of the Alataya and storm the position which was done in gallant style.

"General Twiggs' order to Harney to charge was well timed. Santa Anna had directed a part of his forces on the Telegrafo to oppose Riley, who (hard fighter that he was) met and drove them back just as Harney's men carried the works on the crest." (Wilcox, p. 289.) In this fight Lieutenant Nathaniel Lyon, 2d Infantry, with his company captured three guns. The Mexicans were defeated overwhelmingly all along the line, and Santa Anna and the Mexican army were not heard of again until Scott was within a few miles of Mexico.

On the 19th of April the regiment entered Jalapa, remaining until the end of May, when it set out for Puebla. The marching was delightful, the road level, the country sterile with slight exceptions and the air crisp. The troops remained at Puebla some time, awaiting reinforcements and supplies which the War Department seemed utterly unable to furnish. Company C joined the regiment July 7, 1847.

The army commenced its march from Puebla, August 7, and the Second was, as usual, with the advanced troops. They arrived and camped at Ayotla on the 11th remaining there until the 16th. On the 19th they moved to St. Augustin and immediately advanced to attack the enemy under General Valencia who had drawn up his division for battle at Contreras.

In the two days' battle of that name they had the same duty assigned them as at Cerro Gordo, viz.—that of turning the enemy's position; but this time the position was turned and the work carried without the assistance of a frontal attack.

"The brigade moved on until the advanced regiment reached a ravine on the right of San Geronimo. \* \* \* Riley now passed through the village and Captain Wessells' company was detached to cover a reconnoissance made by Captain Canby, A. A. G., and Lieutenant Tower in the direction of Valencia's camp. Further to the right, Captain Silas Casey's company engaged a body of lancers, supposed to be the Guanahuato Regiment, and repulsed them with a loss of both men and horses. Several of Casey's men were wounded. A Mexican cavalry force threatening Wessells, he attacked, drove it off, and was then ordered to hold his position and observe and report any movement of the enemy from his intrenchments." (Wilcox, p. 365.)

The Second was now some distance in advance of the rest of the brigade and in danger of being cut off, so the 7th Infantry was ordered up to its support. While they were coming up the enemy threatened a charge on the Second, but the regiment was thrown into square to receive it and nothing more than a demonstration was made. The regiment returned to San Geronimo where it remained during the night. Early on the morning of the 20th they moved out of the village. Riley's Brigade was in advance and led off by the flank. The night was so dark and the ground so difficult that it was not until near daylight that its rear cleared the village. At this time Riley's Brigade consisted of the 2d Infantry, 7th Infantry, and the 4th Artillery acting as infantry.

"The troops were moved to the attack in a deep ravine around the left and rear of the enemy. After moving several hundred yards to a slope leading to a high point of the ridge, they came up out of the ravine and found that the enemy had just discovered the movement and was turning his guns and disposing his infantry for resistance." (Ripley.)

The leading divisions of the brigade were deployed as skirmishers and the regiment soon became hotly engaged with the enemy who served two guns upon it with rapidity and received the shock with a noisy, rolling discharge of musketry. Their aim, however, was inaccurate and but little loss was sustained. The advance was not interrupted for an instant, for the troops, having delivered their fire, rushed down with loud shouts in a vigorous charge, and entered the intrenchments almost in a body.

The mass of Mexicans yielding before Riley's vigorous charge, gave way and fled headlong down the road in the direction of San Angel. In this engagement Captain Wessells and Lieutenants Lovell, Tilden and Gardner were wounded, and several enlisted men were killed. "The battle of Contreras was fought and won a little after sunrise on the 20th of August, 1847." (Wilcox, p. 400.)

The pursuit was taken up immediately through the village of San Antonio and on to the village of Churubusco, where Santa Anna had taken up a strong position along the near bank of the stream.

"South of the stream, some hundred yards, lay the scattered houses of the village of Churubusco. One of the most westerly of these was a massive stone convent which had been prepared for defense. It was surrounded by a field work, having embrasures and platforms for many cannon, and was the right point of the Mexican line." (Ripley.)

Here for the second time, in this day of its greatest glory, the regiment stood gallantly to its work and did the heaviest fighting done by any troops that day. Under Captain Morris it attacked the right of the Mexicans on the west side of the convent, the 7th Infantry being ordered to its support. The regiment advanced through a cornfield, and as it passed out of this into an open space in front of the convent, a volley of musketry killed Lieutenant Thomas Easley, a company commander, and killed or wounded twelve men with him. Captain J. R. Smith, struggling forward under the severest fire, was twice badly wounded, and 14 men with him were struck down at the same time. The Mexicans, elated by the effects of their terrible fire, moved out of the convent for a counter-attack, but it was repulsed by the Second U. S. Infantry. An attempt was made to advance and carry the work, but it was not successful, and the battle raged with renewed fury.

Captain Thompson Morris, commanding the 2d Infantry, states (referring to the sorties of the Mexicans) that a column of several hundred passed out of the front gate of the convent and, under cover of the standing corn, advanced towards the left of his regiment, but was driven back; that a second effort was made and checked, and that subsequent sallies met the same fate. (Wilcox, p. 389.)

Finally the Mexican left was driven in, but still the convent held out and was not taken until the colors of the Second Infantry were planted in its rear. The battle of Churubusco was now won but the fighting had been very severe and the losses correspondingly heavy. Our regimental losses



were as follows:—Captain J. W. Anderson, killed; Captain J. R. Smith, twice wounded; Lieutenant Julius Hayden, severely wounded; Lieutenant Christopher Lovell, twice wounded; Lieutenant Thomas Easley, killed; Lieutenant W. M. Gardner, wounded the second time in one day; and Lieutenant T. W. Sweeney, severely wounded. Seventeen officers of the regiment were present on August 20th, and before sunset seven were either killed or *hors de combat*, and about forty men either killed or wounded at Churubusco alone.

The night of the 20th was spent in bivouac on the ground so dearly won, and on the 21st the regiment marched to Coyoacan, near the City of Mexico, where it remained during the armistice. It took post, September 7, in the Hacienda Nalvarte, on the extreme right of the American line, and remained in this position with the rest of the brigade, threatening the enemy's left during the fierce fight at Molino del Rey, but was ordered up in the afternoon to assist in the capture of the place, arriving too late to be of any assistance. The regiment advanced to Piedad on the 9th September.

A question now arose as to whether it would be most advantageous to cannonade and capture the Citadel of Chapultepec at the west of our line, or to operate on the line of the San Antonio gate on the east. The western or Chapultepec line having been chosen, the Second was left at Piedad to assist in the demonstration on the San Antonio gate. It remained in this position, skirmishing frequently with the enemy, until it entered the City of Mexico on the 14th of September, 1847.

Although the Second was not engaged at Chapultepec on the 13th, the storming party from General Quitman's position was largely composed of the regiment and was led by Captain Silas Casey, 2d Infantry.

"A detail from Twigg's Division consisting of 250 men and 13 officers, Captain Silas Casey, 2d Infantry, commanding, was ordered to report to General Quitman early on the morning of the 13th as the storming party of the right of the line."

At 8 o'clock A. M. on the 13th, Lieutenant C. M. Wilcox was ordered by General Quitman to go at once to Captain Casey and give the order to advance.

"On reaching the storming party the order was given to Captain Casey who formed his line in a few seconds and gave the order 'forward.' They moved down the road towards Chapultepec at a double-quick, and for 600 yards were exposed to a raking fire from the Castle, but were partially concealed from view and protected from the fire of the batteries near the road by several adobe houses to the left of it, and by rows of maguey growing along the edge of the ditch. Beyond the houses showers of grape came from the guns of the batteries on the left of the road, passing among and over the men, causing a few casualties, and the hostile musketry opened, knocking over a few men. \* \* \* Two hundred yards beyond the adobe houses the road made a slight bend to the left; 200 yards beyond this were the two Mexican batteries; and in advance of the bend a short distance was a ditch, eight or ten feet deep and nine or twelve feet wide. Here the stormers were brought to a halt, as the ditch could not be passed." (Wilcox, pp. 459-60.)

"But the troops held their ground and pressed on, until, finally, the castle above having been taken, they entered the Mexican barricade with a portion of the Rifle Regiment." (Ripley.)



Captain Casey and Lieutenants Lyon and Steele were wounded in this action. After the march into the City of Mexico on the 14th, the regiment was engaged most of the day in street fighting.

The war was now over but the regiment remained in the City until the 17th of December, on which day it marched to Tacubaya and went into camp until March 27, 1848, when it left for home, reaching Fort Hamilton, N. Y. Harbor, in September. Three months later the entire regiment was on board transports bound for California via Rio Janeiro, Cape Horn and Valparaiso.

Lieutenant-Colonel Bennett Riley, 2d Infantry, was promoted colonel of the First Infantry in January, 1850. He was a most gallant officer and commanded the Second throughout the Seminole and Mexican wars. In 1843 he presented the regiment with a drum-major's baton. On the silver knob is engraved the date of presentation with his name and the regimental motto "Noli me tangere." This baton has been carried ever since at the head of the regiment and is the most valuable regimental relic we have. Colonel Riley was brevetted colonel for Chakotta, Florida; brigadier general for Cerro Gordo, and major general for Contreras. He died in 1853.

The regiment remained in California until late in 1853, occupying stations from Goose Lake, Oregon, on the north, to Yuma, Arizona, on the south, and scouting over the entire country as far as the eastern slope of the Sierra Nevadas. The companies were stationed but a few months in any one place and all their moves were made by marching, with the exception of a few trips on transports up and down the coast. After the return of the regiment to New York it moved west to Carlisle Barracks and thence down the Ohio and up the Missouri to Fort Leavenworth, where it arrived in June and July, 1854.

For the next six years, or until the commencement of the war, the companies were stationed along the Missouri River and as far west as Forts Kearny and Laramie. Among the posts occupied were Ridgely, Pierre, Abercrombie, Randall and Miller.

In 1851 Colonel Brady was succeeded by Colonel E. A. Hitchcock, who resigned in 1855 and Colonel Francis Lee took command of the regiment. Colonel Lee died in January, 1859, and was in turn succeeded by Colonel D. S. Miles, who was killed at Harper's Ferry.

In January, 1861, the regiment was stationed as follows: Headquarters and Companies E and F at Fort Kearny; A, D and I, at Fort Abercrombie; C and K at Fort Ripley; G and H at Fort Riley; and B at Fort Scott. In February, Company B (Captain Lyon) was transferred to St. Louis Arsenal. It was engaged (June 17) in the action fought at Booneville, Mo.

Headquarters and Companies C and K reached Washington from the west in July and were engaged at the battle of Bull Run, July 21, but suffered small loss. These companies were with Major Sykes' regulars, who, "aided by Sherman's Brigade, made a steady and handsome withdrawal, protecting the rear of the routed forces and enabling many to escape by the Stone Bridge." Companies A, D and I, joined regimental headquarters at Georgetown in August.

During July, Companies B and E were in the field in Missouri, and on

August 2d were engaged with the enemy at Dry Springs, Mo. In this fight Company E was commanded by 1st Sergeant G. H. McLoughlin, and B by 1st Sergeant Griffin. Captain Steele, 2d Infantry, was in command and makes the following statement in his report :

"About 5 o'clock P. M., Sergeant McLoughlin's line of skirmishers was attacked on the left and front by a large body of cavalry, some 200 or more of whom were on foot and about the same number mounted. Sergeant McLoughlin gallantly repulsed the first attack but was soon overwhelmed with numbers and obliged to retreat upon the reserve, and all fell back into the road, where I came to their support with the other two companies of my battalion. (W. R., Vol. III., page 49.)

One man of E Company was wounded. The rebels were finally routed with heavy loss. In this action B Company was in support of the volunteer troops.

At the battle of Wilson's Creek, where 3700 men attacked 23,000 Confederates after a fatiguing night march, and fought them successfully over six hours, the same companies of the Second played their usual rôle of brave and unflinching devotion to duty and the cause.

The action commenced at daylight on the 10th August, 1861, General Lyon commanding the Union forces, with the battalion of the Second, a battery, and some volunteers in reserve. Early in this engagement, while General Lyon was leading his horse along the line in rear of Captain Totten's battery and endeavoring to rally our troops, which were at this time in considerable disorder, his horse was killed and he received a wound in the leg and one in the head. The General mounted another horse, and swinging his hat in the air, called to the troops nearest him to follow, but in a short time a fatal ball lodged in his breast and he was carried from the field a corpse. Thus gloriously fell as brave a soldier as ever drew sword, a man whose honesty of purpose was proverbial, a noble patriot, and one who held his life as nothing when his country demanded it of him.

The Union forces were now all but beaten, but just at this time the enemy was observed to be about to renew his efforts, and at once commenced along the entire line the fiercest and most bloody engagement of the day. Not the slightest disposition to give way was manifested at any point. Captain Steele's battalion was some yards in front of the line and in imminent danger of being overwhelmed with superior numbers, the contending lines being almost muzzle to muzzle.

The volunteers rallied, and attacking the enemy's right flank poured in a murderous fire. From this time a perfect rout took place throughout the rebel front, and it was evident that Totten's battery and Steele's little battalion were safe.\*

At 11.30 A. M. the Union forces withdrew unmolested to Springfield, about 12 miles distant. In this action the regiment lost Captain Nathaniel Lyon, killed, and 39 killed or wounded of the 98 men present for duty that morning.

In December Companies B and E were sent to Washington where the regiment (except Company H, at Fort Larned, Kansas) was concentrated under the command of Captain A. Sully. It remained there on provost

\* See report of Major S. D. Sturgis, W. R., Vol. I, page 64, *et seq.*

duty until it moved to Fortress Monroe in March, 1862, with Sykes' Brigade of regulars at the opening of the Peninsular Campaign. From the time of its arrival at Fortress Monroe to June 27th, the regiment moved up the Peninsula to the Chickahominy, skirmishing with the enemy and in reserve during the heavier engagements.

The following are extracts from an account of the regiment at Gaines' Mill, written by Major F. E. Lacey who was the first sergeant of Company I in this the first heavy fight of the regiment in the Civil War.

Bright and early on the morning of the 26th camp was broken, everything packed up, and we moved to Mechanicsville to support McCall's Pennsylvanians who were at that point. Early on the morning of the 27th our line is formed in a sunken road near the old mill which gives the battle its Union name. A grave, a fatal blunder is here made. All the entrenching tools are sent to the rear. We are here between three and four hours before the action commences,—ample time to construct works which would have cost the enemy dearly to approach. About 11 o'clock A. M., the Confederate skirmishers come slowly and cautiously into view, followed by artillery. During this time the infantry is taking position in a strip of timber immediately in our front. The first gun is fired by the rebels; a little later a shot from the enemy kills four of our men. A shell from one of our guns blows up a caisson in a Confederate battery just opposite to us. The artillery duel lasts about half an hour. Soon after it ends the enemy's infantry comes out of the woods to attack us. As they are forming line the Second opens fire on them and sends them reeling to the timber. A fresh regiment takes its place and meets the same fate. Two musicians of I Company—mere boys—go out under a heavy fire and bring in some wounded men. Their names are Robert Nelson and Bartly Scanlan. A body of Confederates now comes out of the timber; the Second springs at them with cold steel and drives them back to the woods.

Here Brinley was killed and Jordan severely wounded—shot through the knee—two gallant officers, a great loss to the regiment. The intrepid bearer of the National colors,—Sergeant Thomas Madigan of A Company, a veteran of the Mexican War,—received a wound from which he died a few days later. The brave old fellow had participated in every battle in which the regiment was engaged in the war with Mexico. The next to take his place,—Corporal Konsmiller, a fine young German,—was shot through the head and killed.

We are now in a critical position, fighting in open ground, the foe in the woods. The enemy repeatedly tries to break our line, but fails; the old Second never wavers but stands like an iron wall. The left wing of the corps having been driven back a considerable distance, we fall back and form in an old peach orchard. This position is held until nearly sunset. Resistance now seems to be in vain, our ranks are fearfully thinned, so we fall back in line of battle with colors flying. We soon come to a bunch of timber and are halted; the left wing does not hear the command and continues its march through the woods. The reason for the halt is explained. A crippled battery is left behind us, the enemy is near at hand, the right wing is asked to save the battery and responds with a hearty cheer, and at the same time dashes to the front led by Lieutenant Parker, 2d Infantry, one of General Sykes' aides. The battery is passed, the wing halts within thirty yards of the advancing enemy, opens fire and brings them to a stand. Lieutenant Drum greatly distinguishes himself. Now the fearless Parker receives a volley: he sways in his saddle and falls from his horse dead. The guns are saved; but at what a cost! We lose more men in this last charge than at any time during the day. The remnant falls back and at dark is

united with the left wing and the battle of Gaines' Mill, after eight hours of hard fighting, is ended.

We kept the enemy in check five hours against overwhelming odds, losing 138 men in killed, wounded and missing. The strength of the battalion going into action was 446 aggregate.

Sergeant Lacey was severely wounded in this fight and became an officer about a month later.

In the change of base to Harrison's Landing the regiment formed a portion of the rear guard and took part in the action at Malvern Hill, suffering no loss. It was in camp at Harrison's Landing until August 14 when it left to join Pope's army in front of Washington, arriving in time to take an important part in the second battle of Bull Run.

The regiment left its camp on the Gainesville road early on the morning of August 30, and moved in the direction of Bull Run Creek, and was formed in line of battle on the left bank of the creek between 8 and 9 o'clock A. M., remaining in that position until about 3.30 P. M., when orders were received to fall back and take position on the right bank of the creek in the timber, near the crest of the ridge. It remained here some fifteen or twenty minutes before the enemy opened his fire, which was intensely severe and continued so for about three-quarters of an hour, when it was ordered to fall back to the timber across the road. Both officers and men conducted themselves, without a single exception, in the coolest and most determined manner, although casualties were very numerous. (W. R., Vol. XII, Part 2, page 499.)

In this engagement Lieutenant Wm. Kidd was killed and Lieutenants Ellinwood and Markley wounded. 71 men were killed, wounded or missing.

The regiment left camp at Centerville September 2, and marched to Antietam Creek, near the village of Sharpsburg, Md., where it arrived September 15 and went into position, remaining there two days exposed to the enemy's artillery and sharpshooters. On the 17th it crossed the creek and went into action in support of Tidball's battery which was hard pressed by the enemy. Lieutenant J. S. Poland, who was in command of the regiment in this fight, makes the following statement in his report:—

"Lieutenant McKee, commanding Companies I and A, 2d Infantry, while deploying to the front was severely wounded and compelled to leave the field. The command of these companies devolved upon 1st Sergeant F. E. Lacey, commanding Company I, 2d Infantry, who handled them well. In advancing to the fence at which our line was to rest, the skirmishers were obliged to pass over a ridge completely commanded by the enemy's sharpshooters and battery posted to the left of the cornfield in front of the right of my line. When we appeared above the crest the enemy opened with a heavy fire of case shot and canister. The line did not waver but rapidly moved to the fence. The right advanced beyond, however, before I could convey the order to them to halt at the fence, and by a well-directed fire compelled the enemy's cannoners to leave their guns. \* \* \* Lieutenant McLoughlin and Sergeant Lacey commanded the companies on the right. Sergeant Lacey was soon after wounded and unwillingly compelled to leave the field. Our position was held until all the ammunition had been expended on the left and nearly all on the right."

In a very short time the regiment was relieved by the 17th Michigan and the 1st Battalion of the 14th U. S. Infantry.

The regiment camped on the battle-field, and on the 29th crossed the Potomac at the ford below Shepherdstown, W. Va., in pursuit of the enemy, and moved about a mile beyond the river where they were discovered in force. The regiment skirmished all day, but had no casualties and recrossed the river that night. In this fight 1st Sergeant Daniel W. Burke, of B Company, distinguished himself by returning and spiking a piece of artillery in the face of the enemy's sharpshooters.

The colonel of the regiment, Dixon S. Miles, was mortally wounded by a piece of shell at Harper's Ferry during September and died shortly afterwards. Sidney Burbank succeeded him as colonel of the Second.

The regiment camped at Sharpsburg, obtaining a much needed rest and reëquipment, until October 28, when it started for Fredericksburg, Va, arriving there about a month later.

At 2.15 P. M., on the 13th of December, 1862, the regiment left its bivouac near Falmouth and formed under cover of the Phillips house and close to the ponton bridge. It crossed the river shortly after and went into position on the left of the road on the south side of the village.

"At 5 P. M., the battalion was ordered to move to the crest of the hill, 100 yards in advance of its former position, to protect the withdrawal of a battery. During this forward movement the battery was withdrawn and the battalion halted in rear of a ditch, the banks of which afforded good cover."

At 10 P. M., they advanced to within about 80 yards of the stone wall occupied by the enemy.

"On the morning of the 14th the enemy opened a murderous fire, driving in our pickets. The battalion was ordered to lie down behind a slight elevation of ground (about one foot), giving some protection, where it was obliged to remain until dark, under a terrific fire, the plane of which passed not more than a foot over the ground on which they lay."

"To move even was sure to draw the fire of the enemy's sharpshooters, who were posted in the adjacent houses and in tree tops, and whose fire we were unable to return. Thus the troops remained twelve long hours unable to eat, drink or attend to the calls of nature, for so relentless was the enemy that not even a wounded man or our stretcher-carriers were exempted from their fire."

"Never did discipline shine more resplendently, never was the reputation of a regiment more nobly, more incontrovertably confirmed than that of the Second: never could a battalion more signally gain the title of brave and excellent soldiers than on that ever-to-be-remembered Sabbath of December 14, 1862." (W. R., Vol. XXI., pages 426-27.)

The regiment remained in Fredericksburg until the morning of the 16th, when it returned to its old camp near Potomac Creek. Sixteen men were wounded in this battle and three missing.

The regiment spent the winter of 1862-63 in its camp at Falmouth, and no movement of consequence was made until late in April when the Chancellorsville campaign commenced. The following are extracts from an account written by Patrick Breen, who was a corporal in the color guard of the regiment during this battle, and afterwards 1st sergeant of C Company and Ordnance sergeant, U. S. A. He is now retired and living at Vincennes, Ind.

On May 1st, advancing in open country in line of battle, Captain Salem S. Marsh

commanding, the regiment halted on the right of the Sixth Infantry in the centre of a field. It was on the right of the entire 5th Corps. Not more than five minutes had elapsed after halting in line before a volley of musketry was poured into our ranks by the unseen enemy, who had been hidden from view by the heavy timber not more than 200 yards in our front. After the first fire was delivered by the enemy we commenced to peg away at the rebels in the timber. In a few minutes the regiment, with the brigade, fell back about 25 yards and opened again on the enemy. The fire of the regiment had a telling effect on the rebels as they could be seen limping off the field every minute. The regiment remained in its new position but a short time when it was discovered that the rebels were moving around our flank. Captain Marsh, ever on the alert, was quick to discover the intentions of the enemy and immediately thwarted the move by changing front to the half-right, at the same time maintaining his position in line with the brigade. Shortly after this a rebel bullet struck him in the forehead, killing him instantly. The command now devolved on Captain S. A. McKee. During the short time that Captain Marsh was in command of the regiment, he endeared himself to the very hearts of his men by his bearing as a soldier and an officer, and his gentlemanly manner at all times, no matter what the occasion.

After we attained the timber to the right of the turnpike and were supported by Hancock's Division, the rebels gradually advanced, very cautiously, and we did not open fire on them until within short range, and then with such effect that they very soon retired from the contest, leaving their dead and badly wounded in our hands. Thus ended the day for the Second Infantry at the battle of Chancellorsville. We laid all the next day behind improvised breast works, rudely thrown up with whatever implements were at hand at the time; even the bayonet was brought into use in this entrenching business. The regiment remained in the entrenchments until the evening of the 3d, and the retreat of the army having commenced that evening in a drenching rain, the morning of the 4th found the 2d Division, 5th Corps, the last troops crossing the river, covering the retreat of the Army of the Potomac, and the 2d Infantry was with it.

Company H from Fort Larned, Kansas, joined the regiment at Benson's Mills, Va., June 13, 1863.

The regiment left Frederick June 29, and made long, rapid and fatiguing marches to the field of Gettysburg, where it arrived about 8 A. M. July 2, and went into position on the right of the 5th Corps. Twenty men of the regiment were thrown forward as skirmishers into a body of woods, beyond which and to the right could be seen the enemy's pickets. After a skirmish of nearly two hours, during which there was considerable firing and some casualties, the line was marched by a flank movement to the left and rear about two miles, where it rested until about 5 o'clock in the afternoon, at which time it moved in the direction of the heavy cannonading on the extreme left of the Union line of battle. As it advanced the rapidity of the firing increased and staff officers rode up rapidly to hurry the command to the front, which was done at a double-time. As soon as the brigade reached the vicinity of Round Top, it formed line to the right, with the 2d Infantry on the right of the line, and advanced at a double-quick down a steep hill and across a marsh fifty yards wide and ankle deep with mire. During this movement the regiment suffered from a severe fire of sharpshooters from the right, left, and front. The marsh being passed, the Second moved rapidly forward and drove a body of the enemy's sharpshooters from



a rocky and exposed elevation, pursuing them into the woods beyond. Here it halted and took shelter behind a low stone wall and remained inactive while column after column of Union infantry moved across and perpendicular to its front. After these troops had passed, the regiment was ordered forward beyond the wall with instructions to wheel to the left in a rye field. The wheel was about half completed when the enemy was observed to be moving rapidly to outflank the right, so the Second halted and opened a rapid and continuous fire, which was sharply returned.

Major A. T. Lee, 2d Infantry, commanding the regiment, was wounded at this time, but gallantly retained command until the loss of blood compelled him to retire just at the close of the battle, Captain McKee succeeding him. The enemy continued to grow stronger on the right flank and the regiment was ordered to retire. The word was scarcely given when three lines of the enemy, elevated one above another on a slope to the right, poured in a most destructive fire, almost decimating the regiment and cutting off the color staff, causing the colors to fall into the hands of the color bearer. Under a most withering fire from the sharpshooters on the left and a column of the enemy's infantry on the right and rear, overwhelmed with a perfect storm of shot and shell, the regiment fell back slowly, recrossed the stone wall, the rocky elevation and the marsh in as good order as the formation of the ground would admit, and returned to its original position on the crest of the hill.

On June 30 the returns show 13 officers and 224 men present for duty. The regiment was only engaged from about 5.30 P. M. until about dark, and in this short time lost Lieutenant Goodrich and seven men killed, and Major Lee and Lieutenants McLoughlin, Burke and Lacey, with 53 men, wounded. On the third and last day of Gettysburg the regiment was in reserve, and although held in readiness was not engaged again during the battle.

The regiment left the battle-field July 5, and having taken part in a reconnoissance near Manassas July 23, reached Warrenton on the 29th, having marched 320 miles since the 1st of June.

In August and September the regiment went to New York for the draft riots, and after the return to Virginia in September took part in the Mine Run campaign, but without coming into contact with the enemy.

The end of the year 1863 found the regiment encamped at Catlett's Station, Va. The only event worthy of note which occurred during the next three months was the death of Captain McKee of the regiment, who was killed by guerrillas while riding from one camp to another.

In the reorganization incident to the coming of General Grant in the spring of 1864, the Second was placed in the 1st Brigade, 1st Division, 5th Corps. It set out from Rappahannock Station for the Wilderness campaign at sunrise on May 1st, and encamped that night at Brandy Station. Crossing the Rapidan at Germannia Ford at noon on the following day, the regiment found itself on the road leading to Mine Run and was ordered forward to attack, driving the enemy some distance back on the pike. It was severely engaged all the afternoon and returned that night to its original position. Early on the morning of the next day it was placed on picket



and remained on that duty until two o'clock on the morning of the 8th, when it rejoined the rest of the brigade at Laurel Hill and was engaged there all day.

From this time until the end of the month it was one continuous round of marching, fighting, picket duty, and entrenchment building. On the 1st of May there were 10 officers and 181 men present for duty, and during this campaign the loss out of this small number was five officers wounded and 45 men killed, wounded and missing.

June 1, 1864, the day before the battle of Cold Harbor, the Second Infantry practically ended its career in the Civil War. The commissioned and enlisted strength had reached such a low figure—less than 100 men—that in accordance with the request of the regimental commander the remaining enlisted men were transferred to C Company, and that company was given a full complement of officers, non-commissioned officers and men. After the battle of Cold Harbor,—where this company lost 8 men killed and wounded, and two officers and 19 men captured,—it went on duty as provost guard of the 2d Division, 5th Corps.

Regimental headquarters were established at Newport Barracks, Ky., late in June, and immediate steps were taken to recruit the regiment. In December, 1864, its total enlisted strength was 405. At this time Headquarters and Companies A, B, , E, G, I and K, were at Newport Barracks Ky.; C at Elmira, N. Y.; F at Sandusky, Ohio; and H at Trenton, N. J.

In the fall of 1865 the entire regiment (except H Company, at Jeffersonville, Ind.) was concentrated at Crittenden Barracks. In spite of the extraordinary efforts to bring the regiment up to a proper numerical strength it still lacked 314 men in January, 1866, but in July several detachments came out from Fort Columbus, so that at the end of the month only 13 men were required.

The regiment remained in Kentucky, with the exception that a few companies were temporarily stationed in West Virginia, until April, 1869, when it moved south to Georgia.

In accordance with the Act of Congress approved March 3, 1869, the consolidation of the Second Infantry with the Sixteenth took place at Atlanta, Ga., in April and May of that year. By this consolidation Colonel Burbank was succeeded by Colonel S. W. Crawford. Two days after the consolidation the regiment left Atlanta and took station as follows: Headquarters and Companies B, D and I at Huntsville, Ala.; A, F and K at Mobile, Ala.; C and E at Montgomery, Ala.; and G and H at Atlanta.

Headquarters were moved from Huntsville to Mobile in January, 1872. In February, 1872, Colonel Crawford retired, promoting Colonel Wallen. During the same year regimental headquarters left Mobile on account of the prevalence of yellow fever and took station at Mount Vernon Barracks until December when they were transferred to McPherson Barracks. While at this station Colonel Wallen was retired and Lieutenant-Colonel Charles Woods, 5th Infantry, was promoted to the Second, only to be retired eight months later. He was succeeded in December, 1874, by Lieutenant-Colonel Frank Wheaton, 21st Infantry, who joined the regiment at Atlanta and remained constantly in command until April 25, 1892, when he

was appointed a brigadier general and took command of the Department of Texas.

In October, 1876, several companies were ordered to various points in the South during the excitement attending the presidential election of that year. This delicate duty having been satisfactorily performed the companies returned to their proper stations and for the first time since the Civil War the entire regiment was together at Atlanta in April, 1877. In February of this year Lieutenant McIntyre was brutally murdered in Gelnier County, Ga., while on duty with and guarding two U. S. deputy marshals and revenue officers engaged in arresting illicit distillers. The party, consisting of Lieutenant McIntyre, one corporal and two deputies, were in the house of one Jones, seated and talking quietly, when an armed mob of 25 or 30 supposed illicit distillers surrounded the house, burst open the front door, and with insults and imprecations commenced a rapid discharge of fire-arms at the four men and several women and children in the room. After a desperate fight of five or more minutes, Lieutenant McIntyre fell dead at the front door, shot through the heart. He was much beloved in the regiment and had served continuously and creditably in the field during the war. The regiment had now been in the South since leaving the field at Cold Harbor in June, 1864. During this time the companies had been constantly moving from point to point, sometimes by rail or boat and again by marching. Their duty was most arduous and disagreeable,—acting as posses for U. S. marshals, enforcing the election laws and the laws attendant on the reconstruction, breaking up illicit distilleries, etc., etc. The following were some of their stations:—Guyandotte, W. Va., Jacksonville, Ala., Summerville, Ga., Columbia, S. C., Tuscaloosa, Spartanburg, Chattanooga, Asheville, Tallahassee, St. Augustine and Aiken.

The Nez Percés Indians were on the warpath in the spring and summer of 1877, and the regiment was ordered to Idaho and Washington Territory to take part in the campaign. It left Atlanta July 13, and proceeded by rail and boat to Lewiston, Idaho, where it arrived after a journey of 16 days. Soon after arriving, the regiment marched to Spokane Falls to head off the Indians who were reported as moving in that direction. The troops were on the move all that summer and fall, but in December had settled down for the winter at the following stations:—Headquarters and Companies A, B, D, F and G, at Fort Lapwai, I. T.; E at Fort Colville, W. T.; C and K at Mount Idaho; and H and I at Spokane Falls, W. T.

In March and April, 1878, Companies A, G, H and I, Lieutenant-Colonel H. C. Merriam commanding, established Camp Cœur d'Alene, I. T., at the source of the Spokane River on Cœur d'Alene Lake, and soon after commenced the construction of the most beautifully situated post in the country—Fort Sherman.

In the spring of this year the Bannock Indians left their reservation, and a portion of the regiment was out until late in the fall and aided materially in bringing them to terms. Company C did harder work in this campaign than any other organization in the regiment, marching over 1630 miles. The following June saw this company in the field again. This time they were after a marauding band of Indians known as the "Sheep-eaters."

While passing through a deep cañon near Big Creek, I. T., on July 27, they were ambushed and had two men wounded. Two days later they struck the Indians again and had a slight skirmish but no casualties, and on August 29 they lost one man killed in action near the same place.

Regimental Headquarters moved from Fort Lapwai to Fort Cœur d'Alene in August, and Companies D, E and F, marched to Lake Chelan, W. T., and established the camp since immortalized by the regimental ballad, "When Camp Chelan was new."

January, 1880, found the regiment stationed as follows:—Headquarters and Companies A, B and G, at Fort Cœur d'Alene, I. T.; C and H at Fort Colville, W. T.; D, E and I, at Camp Chelan, W. T.; F at Fort Harney, Ore., and K at Camp Howard, I. T.

In October the companies at Chelan, including Company F, which arrived there in August, moved to the junction of the Spokane and Columbia rivers and commenced the construction of the post now known as Fort Spokane.

During the remainder of the regiment's sojourn in the Northwest, little of note occurred to break the monotony of frontier garrison life. Boisé Barracks, I. T., Fort Klamath, Ore., and Fort Townsend, W. T., were garrisoned by companies of the regiment before they came East in 1886 to Fort Omaha, Neb., where they are stationed at the present date (March, 1895).

The regiment was engaged in the Sioux Campaign of 1890-91 at Pine Ridge, and was under fire at the defense of the agency at that place. The present colonel, John C. Bates, was promoted to the regiment from the 20th Infantry in April, 1892, when General Wheaton was promoted brigadier general.

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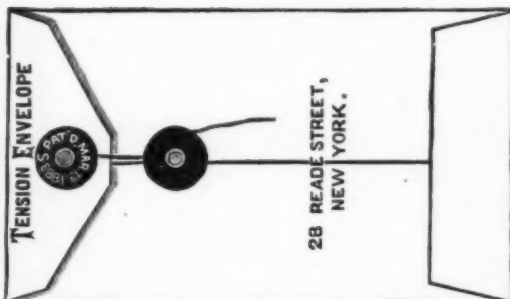
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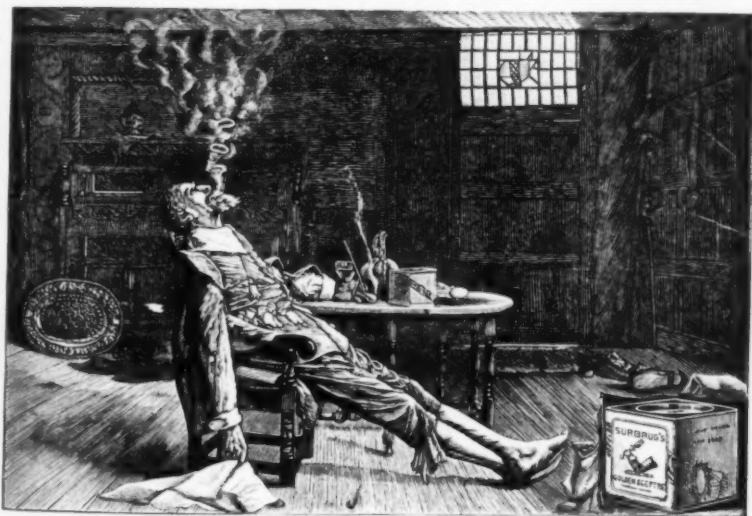
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